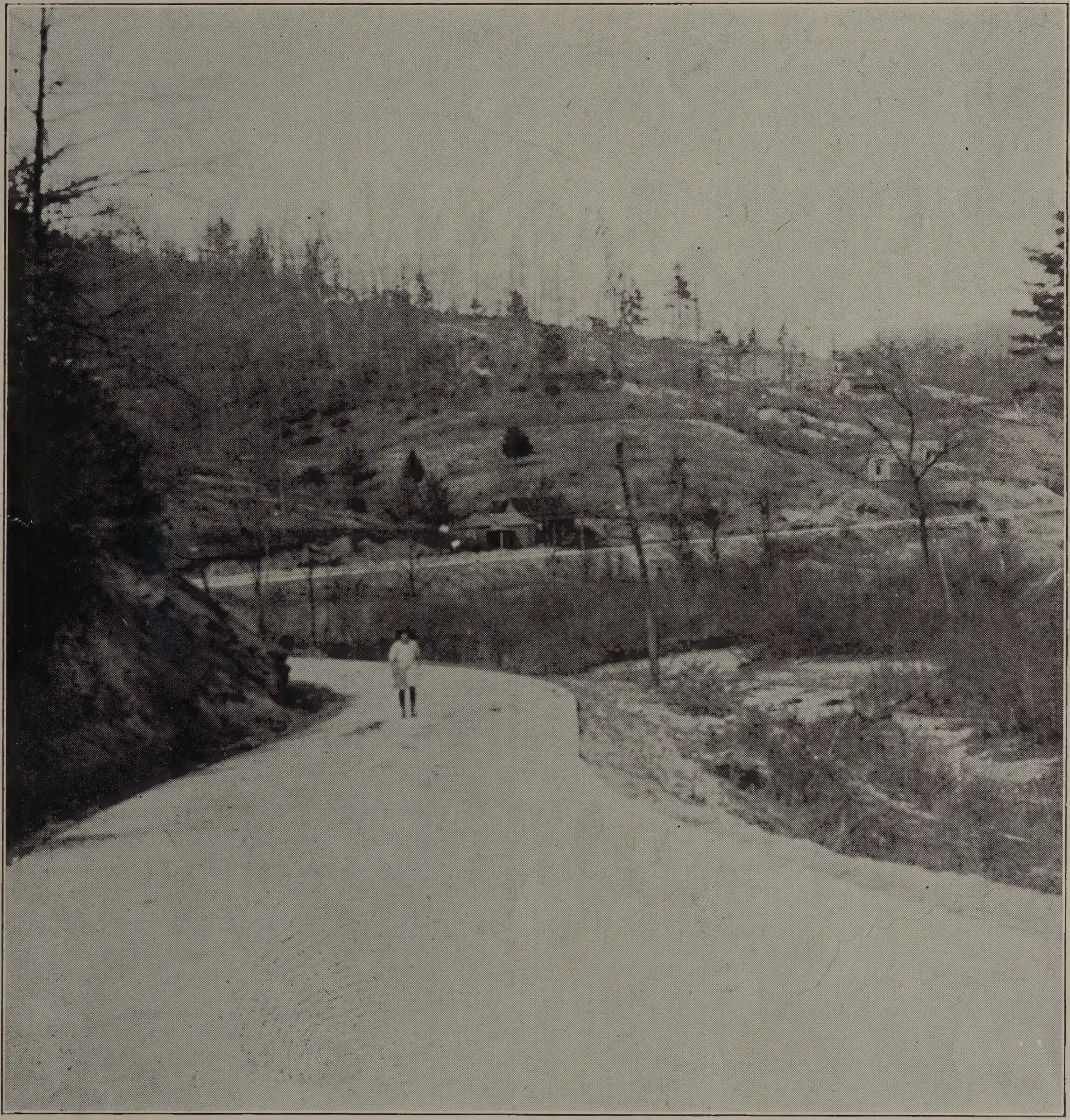
North Carolina Highway Bulletin

VOL. III APRIL, 1922 NO. 2



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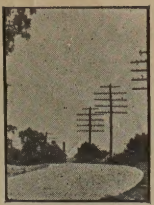
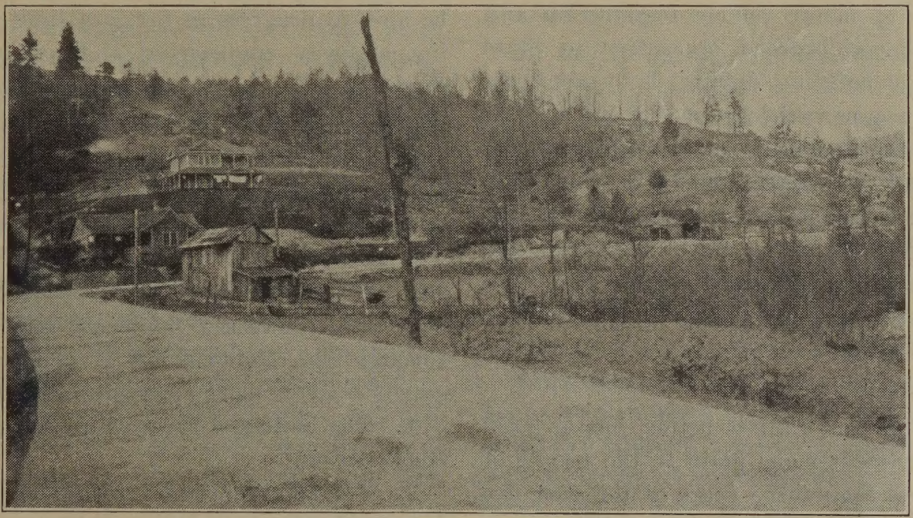


Vol. III, No. 2 H. K. WITHERSPOON, Editor APRIL, 1922

Building *a* Road *on a* Feather Bed

TO compare the subgrade of a hard surfaced road to a feather bed seems at first thought to be rather far fetched and yet this is the condition with which the State Highway Commission met when construction began on Federal Aid Project No. 94-A, Mitchell County. In this section of the State, situated in the heart of the Blue Ridge mountains, the soil is made up largely of decomposed mica rock and mica, or more commonly called mica schist. This formation is of a very spongy, resilient nature and offers no resistance to any weight put upon it. To go back to the comparison drawn at the beginnning of the article, when a weight, such as a wagon or truck, is applied at any point the soil simply gives way and rises at another point, much the same result as may be noticed by pushing one's hand in a feather bed thus making the feathers rise in another point. In addition to the characteristics mentioned above the soil is extremely slick and slipping especially in wet weather—making travel impossible most of the winter.



SECTION OF PROJECT 94-A SHOWING CHARACTER OF COUNTRY

Such, briefly, were the conditions which the engineers of the Highway Commission had to overcome before a road could be built which would bear the traffic to which it was subjected.

The type of construction originally planned for this project was a surfacing of Natural Rock Asphalt laid on a base course of broken stone. After a short stretch of this construction was laid it was found that when a truck was driven over it that the surfacing gave way under the wheels of the truck and bulged up in the middle of the roadway until after the truck had passed when it again rose in the wheel tracks. Thus the problem resolved itself into the necessity of laying a surfacing and base course which would be rigid and which would bear the weight of a loaded vehicle over the entire surface rather than on the small portion of the surface immediately underneath the wheels. Following a thorough investigation of conditions it was decided to lay a plain concrete pavement 14 feet wide, except for about one thousand feet in the town of Spruce Pine where a base course of concrete was laid with a surfacing of rock asphalt. A supplementary contract was drawn up with the Gibson Construction Co., of Knoxville, Tenn., who were the original contractors on the project. Since this change in construction was made work has been progressing very satisfactorily and at present the project is approximately 73% complete. Since the first of January the work has been carried on by the Fiske-Carter Construction Co., of Greenville, S. C., to whom it was sub-contracted, and who also have the contract for the construction of State Project No. 855 which adjoins Project 94-A on the west and extends to the Yancey County line.

Federal Aid Project No. 94-A is located between Newland, Avery County, and Spruce Pine, Mitchell County forming an important link in the highway which con-

(*Continued on page 11.*)

Highway Chief Outlines Federal Policies

Extracts from Address before recent Annual Meeting of the Association of State Highway Officials, by THOMAS H. MACDONALD, Chief, Bureau of Public Roads

WE comprehend now as we have not understood in the past, the influence exerted upon our national life by transportation. It is the factor we find now interposed between supply and demand, between the starving thousands and food supplies, between producer and consumer. It is a factor whose absence separates, and whose presence ties together communities, States, and the Nation as a whole. To supply adequate and increased transportation facilities is the motive which has influenced the American people to increase the number of motor vehicles in use since 1910 more than 1800 per cent. To provide the complement of the motor vehicle, the improved highway, is the underlying reason why the larger funds have been made available from State and Federal sources. The proper combination of these two to serve a definite purpose in the nation's economy—this is highway transportation in the making.

More enlightening than any statistical quotation is the graphic picture of motor vehicle registration and highway funds. The widespread opposition to State programs of highway building during the years from 1910 to 1916 when motor vehicles were pyramiding at an unforeseen rate, the increased funds made available following the Federal Aid Act of 1916, the stagnation of actual expenditures during 1917 and 1918, the competition of industry of 1919 for materials, labor, and even more important, for rail transportation—all these have played a major part in producing the wide difference between the improved highways demanded by 9,300,000 motor vehicles and the actual new mileage constructed.

The record for 1920 and 1921 is better, but let each State highway department make plain to the people of its State that for less than three years of the past five since large funds became available, have conditions permitted highway construction on an increasing scale. The facts which are true of construction are true also of maintenance.

The charted figures of expenditures are not exact, yet such error as exists lies principally in those funds which are raised and used locally and which do not reach the principal highways or result in more than haphazard repairs of local roads. For the past several years, since every State has had a highway department, the figures are substantially correct as to all funds which are a factor in this discussion.

The conclusions are self-evident:

1. During the period 1910-1921, the potential number of motor vehicles demanding highway service increased more than 1800 per cent; our actual expenditures for construction and maintenance increased about 400 per cent.

2. During the period 1910-1918, motor vehicles increased more than 1100 per cent, highway expenditures about 140 per cent.

3. During the period 1918-1921, motor vehicles increased about 700 per cent, and highway expenditures about 260 per cent of the 1910 figures.

Those who are a part of these organizations have the good fortune to be engaged in their chosen field when the greatest development that can ever come is taking place. The first two or three years of something more than a decade of major road building have passed. What has gone before has been largely preparatory—a period of organization. What will come after—perhaps ten, perhaps fifteen years later—must by then be largely standardized, largely routine. The highway organizations that come after will not have such opportunities to render good, or, equally true, bad service, or be able to progress so far in a limited time in advancing highway engineering and administration, and in combining the motor vehicle and improved highways into scientific highway transportation.

It is not possible to define for a definite period of time the exact progress made for the United States as a whole, for there is no fixed point common to all States. Yet, from the standpoint of highway service, I list our outstanding progress for the past two years in this order:

1. The increased highway service made possible through the establishment of proper methods and the expenditure of more adequate funds for maintenance.

2. The increased highway service resulting from new construction.

3. The adoption and enforcement of better engineering standards.

4. The improvement in the administration of highways as a public utility.

Although the new construction has been very large, the mileage of highways of all types that have been brought to a serviceable condition or restored after a period of inadequate repair, is still greater. The outstanding results secured from the distribution of the large quantities of war surplus materials and equipment are found in the better and more extensive highway maintenance made possible. The Bureau estimates that by the end of the year war surplus to the amount of approximately $150,000,000 in value will have been distributed for use in highway improvement.

Without the detail by states, as a national program the following shows the progress by years in placing new road work under way:

(*Continued on page 9.*)

The First Birthday *of the* State Highway Commission

THE present State Highway Commission celebrated its first birthday on April 1st, and is now entering on its second year of existence. During the past year it has grown from an infant organization into an organization which ranks with that of any other state in the union. From a force of approximately 500 people it has grown into a well balanced organization of perhaps two thousand employees, including laborers making up the forces maintaining North Carolina's roads. The Commission now occupies quarters in a state-owned buliding in which the departments making up headquarters function.

In the way of maintenance the forces of the Commission have worked wonders with the roads of the state, bringing those roads which were not completely worn out up to a high standard of maintenance and making the worst of the roads in better than passable condition. It is with a pardonable sense of pride that the Commission points to the work of this branch of the organization during the past year. In considering what has been accomplished by the maintenance forces it should be remembered that prior to the enactment of the Doughton-Connor-Bowie Law maintenance of roads in the state was left up to the various county or township units, which in a majority of cases meant that the roads were not maintained. The State Highway Commission acted only in an advisory capacity and bore a nominal portion of the cost of maintenance.

A comparison of figures as of April 1, 1921 and the first of April a year later will show clearly what has been accomplished along construction lines. On the former date there were 74 projects under actual construction, having a total mileage of 667.62 miles and estimated to cost $9,727,317.21. The work was divided as follows: 17 projects, aggregating 107.27 miles and costing $3,510,542.40, were of the hard surface type; of the lower type of construction, there were 55 projects having a total mileage of 560.35 and representing an expenditure of $5,966,362.01; two bridge projects were under construction costing $250,412.80.

All of the work being handled by the Commission at this time was being carried on with the assistance of Federal Aid funds and as the allotment for North Carolina had practically all been expended very little work was under contract. There was no hard surface work under contract and only two projects of the lower type of road, 26.23 miles in all and costing $172,178.77. In addition to this there were two projects consisting of bridges only which were estimated to cost $436,546.56, thus bringing the total amount of work under construction to $608,725.33.

Thirty-six projects, approximately 200 miles of road and one bridge, representing an investment of $2,463,- This work was divided as follows: 45.16 miles of hard 920.12 had been completed on the date mentioned above. surfaced road costing $1,401,062.25; 154.14 miles of topsoil, sand-clay or gravel road costing $1,003,632.97; one bridge costing $59,224.70.

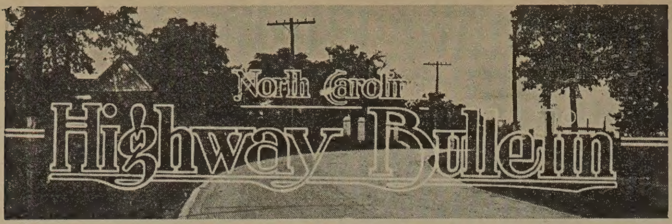
At this point it should be mentioned that very little was done by the new Highway Commission in the way of construction work between the time it began to function and July 1st as this period was largely devoted to effecting an organization capable of carrying on the large highway program outlined in the new law. Thus construction work so far as the present Commission is concerned has only been under way for something like nine or ten months. During this period of time work under contract, construction and completed more than doubled the amount of work in the same status on April 1, 1921. In round figures work handled by the Commission as of April 1, 1921 was estimated to cost $12,800,000.00 while one year later the work had reached almost $31,000,000.00.

As will be seen by referring to the tables given elsewhere in this issue there were under actual construction on the first of this month 119 projects, 8 of which consist of bridges alone, totalling 1,029.27 miles and estimated to cost $15,300,277.94. Approximately one-fourth of the mileage, or 231 miles is of the hard surface type and will cost in round figures $7,700,000.00. The remainder, or 798.24 miles, is being constructed of topsoil, sand-clay, or gravel and will cost $7,100,000. Eight bridge projects will cost $508.829.00.

Work under contract, upon which construction has not begun totals almost $7,000,000 and when completed will add 315.6 miles of improved highways to the State Highway System. Two-thirds of this mileage, or 214.65 miles, will be hard surfaced immediately at an approximate cost of $5,962,000.

Most of the work which was completed during the past year was Federal Aid work and the construction cost shared, in most instances, by the Federal Government, the state and county in which the work is located, eighty-five projects of this kind, having an aggregate mileage of 608.5 and built at a cost of $8,500,000. Five projects which were built solely from state funds had been completed at a cost of $172,441.75 for the 16.8 miles included. This brings a grand total of all work handled up to April 1, 1922 to $30,937,698.48, a large amount it is true but an investment in every sense of the word. North Carolina ranks with the first in highway developments and the fact that she is rapidly acquiring a network of good roads over which her vast variety of products can be more easily and more cheaply transported to market.

(*Continued on page 7.*)



PUBLISHED MONTHLY BY
NORTH CAROLINA STATE HIGHWAY COMMISSION
RALEIGH, NORTH CAROLINA

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Address all communications in regard to BULLETIN to the Editor, Box 1140, Raleigh, N. C.

This BULLETIN will be sent gratis to any State or county official, contractor, newspaper, trade publication, library, or other person interested in the improvement of roads and in the work of the Commission. Advertising rates may be obtained on application.

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Editorials

One year ago the first of this month the present State Highway Commission came into being through the enactment of the Doughton-Connor-Bowie Bill. Since that time it has grown from a comparatively small organization into one numbering approximately 2,000 men and women. The task of constructing and maintaining the State Highway System, in round figures 6,000 miles in length requires the constant attention of those engaged in this work. One has only to drive over the roads of the State and compare their present condition with that of one or two years ago to realize the change that has taken place. Some interesting figures are given on page 5 on construction work during the year.

Bids will be opened on May 25th at 10 a. m. on 18 projects totalling 171.15 miles of road and bridge construction. Slightly more than half of this mileage, or 86.41 miles, will be immediately hard surfaced and the remainder, 84.74 miles will be surfaced with some one of the lower types of material. The longest of the projects to be hard surfaced is 17.6 miles in length, located between Reidsville and the Virginia State Line. This is a very desirable piece of work and should attract a number of bids from the larger contracting firms. Work has been let at very reasonable figures this year and for this and other reasons it is deemed expedient to let at the present the maximum mileage possible.

In order that engineers and others throughout the State may become familiar with the policies of the Bureau of Public Roads in regard to Federal Aid work there is published in this issue an address by Thos. H. McDonald, Director of the U. S. Bureau of Public Roads, delivered recently before one of the road conventions. Aside from outlining the policies above mentioned the article contains some interesting and valuable information.

Mail Boxes on the State Highways are apt to become a menace to the travelling public unless placed as suggested by the Fourth Assistant Postmaster General in his notice which is found on page 11.

Tourists passing through Raleigh are almost without exception lavish in their praises of the maintenance work in North Carolina. They report the condition of roads in this State far above the average in some States through which they pass.

Contracts Awarded March 15th *and* 30th

CONTRACTS representing an expenditure of approximately $2,142,500 and calling for the construction of 116.13 miles of the State Highway System were awarded during the past month. The results of the two lettings held on March 15th and 30th were as follows:

First District

Nello Teer, of Durham, will grade and surface with sand-clay approximately 13.0 miles of road between Scotland Neck and Rich Square, Halifax-Northampton, while the structures on the same project were awarded to Richards Bros. of Raleigh, the cost of construction being estimated at $131,712.13.

Third District

Project No. 378, Pender County was awarded to C. W. Lacy, of Wilmington, his bid for grading and surfacing with waterbound macadam the 13.6 miles of road being $213,502.96.

Fourth District

Reinforced concrete will be laid on Project No. 28 Granville County, this work having been awarded to the Pittman Construction Co., of Atlanta for $142,637.77, this figure covering both grading and structures on the 4.2 miles included in the project.

C. B. Hester, of Greensboro, was the successful bidder on Project No. 445, Lee County, his figure for grading and topsoiling 5.9 miles of highway being $13,422.27.

Project 492, Warren County, 4.5 miles long, was awarded to Porter and Peck, of Greenville, their bid being $86,833.00 for grading and surfacing with penetration macadam. A. C. House, of Weldon, was awarded the structures on the same project on a bid of $4,972.57.

Porter and Peck were successful bidders on Project No. 493, Warren County. The surfacing will be of penetration macadam and will cost for the 3.88 miles included approximately $78,000.00.

Fifth District

Project No. 539, a short stretch on Montelieu Ave., High Point, was awarded to Robt. G. Lassiter & Co. for $21,639.20, for 0.6 mile of sheet asphalt pavement.

O. A. Mann & Co., of LaGrange, Ga., will build 10.45 miles of sand-clay road in Hoke County at an approximate cost of $23,000.44 while J. T. Pigg, of Manning, S. C. will build the structures on the same project, No. 544, for $6,588.00.

Project No. 588, from Reidsville to Wentworth, Rockingham County, was awarded to Cheatwood & Driscoll, of Richmond, on a bid of $220,263.00 for grading and surfacing with reinforced concrete the 7.98 miles included in the project.

Sixth District

Gus Ginn, Inc., of Gastonia, and R. M. Thurmond, of Lynchburg, Va., were awarded the grading and structures respectively on Project No. 601, Alexander County at a cost of $33,600.00. Topsoil will be used for surfacing the 3.07 miles included.

The Laurinburg-Maxton road, in Scotland-Robeson counties will be graded and surfaced with concrete by P. R. Ashby, of Raleigh and the structures built by Chitwood & Palmer of Columbia, S. C. Both plain and reinforced concrete will be used in the surfacing owing to the unstable foundation on which the road is to be built. The cost of construction of the 7.11 miles making up this Project No. 677, will be approximately $284,000.

Seventh District

The Road Commission of Caldwell County were low bidders on the grading and topsoil surfacing on Project 724, which is 4.66 miles in length, and R. M. Thurmond low bidder on the structures, the total of the bids being about $52,000.00.

Project No. 790, Surry-Wilkes counties, between Brooks Cross Roads and Elkin, was awarded to the Pittman Const. Co., of Atlanta for $308,123.42. for 10.17 miles of plain concrete pavement.

Eighth District

Dunn & Woodall of Atlanta, Ga., were awarded the contract for grading and surfacing with penetration macadam 5.96 miles of road in Polk County, between Columbus and the South Carolina State Line. The Henry Construction Co., of Greenville, S. C., were awarded the structures on the same Project. The total cost of construction will be about $126,500.00.

Ninth District

Project No. 903, Buncombe County, 2.58 miles in length, was awarded to the Asheville Paving Co., for the grading and Topeka surfacing and to R. C. Stevens, also of Asheville, for the structures, the approximate cost of construction being $91,300.00.

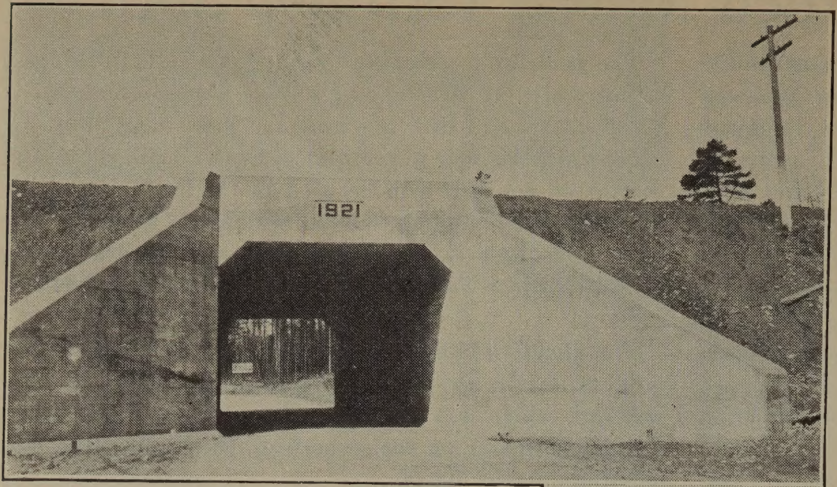
R. H. Wright & Sons, of Asheville, were awarded 11.85 miles of waterbound macadam in Jackson County and the structures to W. T. Moore Concrete Products Co., of Andrews, for approximately $227,000.

The structures on Project No. 962, Macon County were awarded to the Griffin Construction Co., of Atlanta, Ga., for $33,111.75. The grading and surfacing work was not awarded.

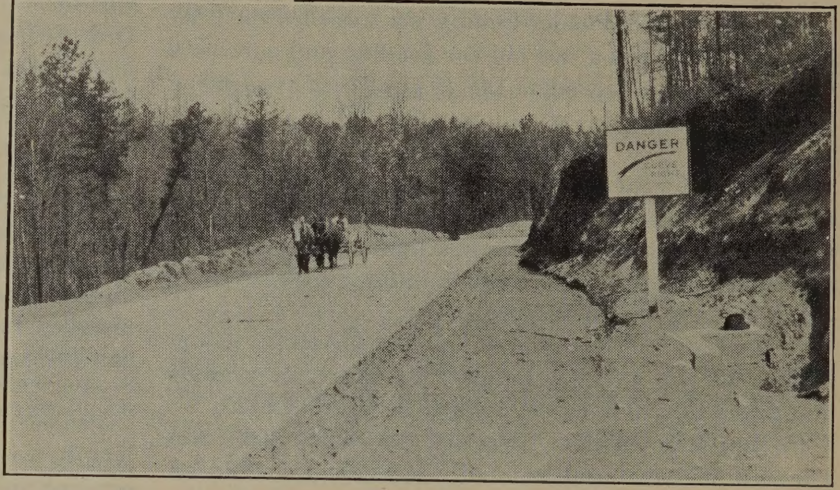
The First Birthday *of the* State Highway Commission

(Continued from page 5)

A word about the organization which has developed in the past year would not be amiss in this connection for the results accomplished by the State Highway Commission during its initial year are due solely to the men, and women, comprising the various departments of the Commission. The Editor does not speak in a boastful manner whatsoever when the statement is made that there is no organization in the country in which a stronger spirit of cooperation prevails, nor is there one which, taking all things into consideration, functions more efficiently. The sole object of every member of the organization is to do his part towards building for North Carolina the best system of highways that can be built.



Underpass Near Marion
Under C. C.& O. Rwy.



Section of State Project 844, McDowell
County Built of Plain Concrete
18 Feet Wide

Marion-Clinchcross Road Completed

Besides adding another hard surfaced link to the Central Highway the completion of State Project No. 844, McDowell County, affords the people of Marion a paved highway between that town and "Clinchcross," or Marion Junction, where the Carolina Clinchfield and Ohio Railroad crosses the Southern Railway.

As originally located and constructed there were several dangerous curves in the road and a very dangerous grade crossing at the C. C. and O. Ry. In locating the present road the route between the two points mentioned above was changed somewhat, keeping straight ahead after crossing the railroad instead of a sharp turn to the left, and entering Marion on the northern side instead of the center. The most important feature of the relocation however is in the elimination of the grade crossing which has heretofore existed on this road. The value of an underpass or overhead crossing cannot be measured in terms of dollars and cents but rather in human lives for at some time be it sooner or later, a human life must pay the price of every grade crossing and these menaces to highway travel should be eliminated. The underpass at the point mentioned is a handsome structure of reinforced concrete having a roadway seventeen feet in width and an overhead clearance of fourteen, this being the standard clearance required by the State. It was constructed by engineers of the railroad company at an approximate cost of $20,000, a portion of which expense will be borne by the State Highway Commission.

The roadway of Project No. 844 is of plain concrete construction eighteen feet wide on a thirty-foot graded roadbed. It was built by the Bolton Construction Company, a Marion firm at a cost of approximately $60,000, in eighty-five working days. This figure includes only the fine grading, shaping up shoulders, and surfacing, the preliminary grading having been done by J. A. Kreis and Company, of Knoxville, Tenn., as a part of Federal Aid Project No. 84-B. The work has been completed in a very satisfactory manner and is a good example of concrete highway construction

Highway Chief Outlines Federal Policies

(*Continued from page 4.*)

FEDERAL AID PROJECTS UNDER CONSTRUCTION AND COMPLETED BY CALENDAR YEARS

Calendar Years	Estimated Cost For Year	Federal Aid For Year	Miles For Yr.
Previous to and inc. 1918	$ 18,088,000	$ 7,568,250	1706
1919	119,746,270	52,210,105	8071
1920	212,292,815	89,904,752	11754
To Dec. 1 1921	141,362,865	59,900,615	6986
Total	$491,489,950	$209,583,722	28517

On November 1, 1921, our records showed the following mileage and costs of roads completed and under agreement:

MILEAGE AND TYPES COMPLETED AND UNDER AGREEMENT NOVEMBER 1, 1921

Type	Total	Federal Aid	Mileage
Graded and Drained	$ 55,704,253	$ 24,721,021	6864
Sand Clay	22,226,362	10,495,172	2696
Gravel	104,614,067	47,192,895	10044
W. B. Macadam	22,452,779	9,729,201	1291
Bituminous Macadam	41,412,557	18,646,066	1323
Bit. Concrete	23,445,375	9,299,864	772
Concrete	184,021,245	75,600,279	4654
Brick	22,039,845	6,925,453	444
Bridges	20,235,200	8,525,395	*47
Totals	$496,151,683	$211,135,376	28135

As a foundation for the consideration of future policies under the new legislation, the Secretary of Agriculture has authorized and requested me to express clearly and without reservation his position that in the formulation of the new rules and regulations required, and in the administration of the law, the Department will request the counsel of this Association through its proper committee. The Secretary is greatly impressed with the possibilities and responsibilities of the new Act, and the truly cooperative spirit which must underlie the functioning of both the State and Federal organizations to make the greatest and surest progress.

The Act itself is remarkably comprehensive in defining and demanding a systematic plan, national in its extent, for future highway development. None of us have had, or are ever likely to have a more serious responsibility than the one imposed of selecting the Federal Aid system to be composed of the most important highways, articulating not only within the States, but with the systems of the contiguous States. Here is an opportunity to do a big, basic work, such as comes to few in the course of a life-time. The individual who fails to vision the importance of the task has no moral right to hold a position of authority in its performance. From a conception of highways as a purely local institution, a viewpoint we held for over a century of our national life, we progressed to an acceptance of their importance to the State. This attitude persisted for another quarter of a century, until, through the universal use of the motor vehicle, the transportation crisis of a great war, the repeated threats of extensive railroad tie-ups, and the results already secured with Federal Aid, we have, in the short period of five years, visioned our more important highways extended and inter-connected to form a vast network, serving local, State and National traffic, only limited by the confines of the United States. This is the conception which has been written into the law, and which, because of the projected effect of that which is done now into the future, lifts the importance of this requirement, that is, the selection of the Federal Aid system, above any other principle or duty therein announced.

This work must not be hurriedly done, but because of the unemployment situation urgently demanding every possible relief that may be obtained through the highway program, projects will be approved without delay for the building of roads which the States and the district engineers of the Bureau agree will lie upon the Federal Aid system. Each district engineer is fully informed as to the procedure for ''interim'' projects, which is so simplified that if important projects are chosen in good faith there will be no delay in securing favorable action.

The Department will do everything possible to expedite projects that can bring any relief from the unemployment crisis now, or that will shorten the winter season of inactivity in road building in the Northern States. The revised regulations will not be issued until they have been considered in detail with the representatives of the Association.

There can be no doubt as to the clear intent of the law to provide for a system of roads which shall include those which are now and which after improvement are to become the major traffic lines. The different states of improvement to which the States have progressed, and all the variations between them of topography, of population distribution, of industries, of development of natural resources, must necessarily be reflected in the laying out of the system. These details must be worked out between the States themselves and between the States and the Bureau of Public Roads. Because of these wide variations, it is only possible to suggest some of the major considerations. We do not minimize the importance of the local traffic. To care for this class propery will, in general, always be the first objective of highway improvement. Our conception is rather that a choice of highways shall be made which, regardless of the order of improvement, will eventually join into a well conceived network crossing both county and State boundaries. Thus, while the immediate needs of a State or a district may determine priority of construction each new link brings nearer the completion of the system as a whole.

In the same spirit that the United States by a courageous and generous policy has made possible definite progress in the limitation of armaments to be followed by a consequent decrease of national expenditures for potential destruction, it is my sincere belief that the highway organizations will make possible through mutual agreement the consummation of a splendid national system of highways. This comparison is not lightly made, for the program ahead involves hundreds of millions of dollars, but with this essential difference, that this huge expenditure will be for a constructive, nation-building purpose. In the great agricultural districts where the major road development is still ahead, and where the connecting up of continuous routes will at the same time serve the local traffic equally with other projects, it is hoped that the States will recognize that duty imposed upon the Department, expressed in the language of the law, "The Secretary of Agriculture shall give preference to such projects as will expedite the completion of an adequate and connected system of highways, inter-State in character."

In the eastern States, some of them with a large mileage of improved roads, it might appear that the selection of a system is not so important, yet it seems to me that it is here that our greatest traffic problems lie.

The traffic lines are from town to town, and in general follow through the most congested parts of population centers. As some of the principles which we must properly work out, the following are suggested:

1. The development of parallel lines to divide heavy traffic through thickly populated districts.
2. The development of direct, short mileage routes, although on these routes there may now be a less amount of improved roads than on routes now followed.
3. The building of inner or outer belt lines around congested centers.
4. The reconstruction of weak sections for heavy truck traffic.
5. The widening of main routes near the largest cities or between cities where the distance is short enough to carry uniform traffic.
6. Proper connections with the routes of adjoining States.

Possibly there are many questions as to the future surfacing policies. The changes in types and specifications which will be sought from time to time by the Bureau will be based upon the more accurate knowledge which is being obtained rapidly through research and through the detailed studies of the behavior of modern designs under traffic. The requirement of the 18-foot surfacing is construed to mean that this is fixed as the minimum two-way road, where the construction is to be considered complete as first put down. This requirement will not preclude the building of a narrower pavement in those districts where the traffic does not yet justify the two-way width. I am yet to be convinced that we may not properly build now in many sparsely populated districts one-half of the final width of pavement in order to complete mileage between points, if all other work is done to provide for the full width construction later.

To insure maintenance, the strongest possible requirements have been written into the law. The Department may not slight its responsibility, and the attitude of the whole national administration demands the utmost fidelity in the continuous upkeep of the highways built. The position taken by the President in his published addresses is well known. His statements to the Executive Committee of this Association, who counseled with him while the present legislation was under consideration, the statements of the Secretary of Agriculture in presenting the completed legislation to the President for his signature, all leave no possible doubt as to the position which must be taken by the Bureau in enforcing the provisions as to maintenance.

It is not necessary to touch upon all the points of the law. I have endeavored to accent the establishment of the system of Federal Aid roads as beyond all other principles, the most important written into this law. Of only slightly less importance is the requirement as to maintenance. While our thoughts may run to large construction programs, and the details of types and materials to be used, let it be remembered that we are providing highway service, and that the degree of service rendered is determined by the lay-out of the system, and by the condition in which every mile of road within that system is maintained constantly.

The whole purpose of highway building is to make possible highway transportation, and the cost of the transportation must be reduced as low as possible. Therefore, restrictive legislation which limits too greatly the loads to be hauled on the highways should not be tolerated, as it is against a proper public policy. Legislation regulatory of the traffic on the highways should take into account that there are many factors which govern the traffic depreciation of our highways. Laws which blindly fix some minimum weight to be moved on the highways may prohibit the really profitable traffic and allow less economical and more destructive vehicles to operate practically unchecked. Both weight and speed are major factors in their destructive effects upon the highways, but the distribution of the load, the relation of the sprung and unsprung weights, the tire equipment—all have an important effect. From the research of the past two or three years, and from the practical experience of the highway organizations, we are accumulating sufficient knowledge to engage understandingly on a determination of the character of legislation which will result in a sound public policy. The solution of highway transportation lies in the proper adjustment, no less of the motor vehicle to the road than of the road to the motor vehicle. I hope to see no conflict develop between the States in the determination of traffic regulations. Such would destroy in a large measure the utility of a Federal Aid system of primary highways. Rather, because the system will for a long time be non-uniform in its carrying capacity, much discretion should be allowed the State highway departments in determining the loads which are to operate upon specific sections of highways, and further, much discretion should be allowed the departments in the making of seasonal restrictions where climatic conditions are such that there are periods when the roads normally fully capable for carrying heavy loads, are for a short time carried in uncertain subgrades. Here is an opportunity for the highway builder and the motor truck manufacturer to cooperate to serve the public's interest.

One other point is causing the public much concern. It is often stated that highways have gone to pieces and must be rebuilt. Engineers have been prompt to develop methods of improvement which are salvaging practically the full value that was originally invested in the highways. For example, some of the older macadam roads in New York State, lightly built, which are now heavy traffic lines, have been widened by concrete roadways on either side preserving the strip of macadam, say 6 feet wide in the center, thus giving a 24-foot usable surface by the addition of 18 feet of new construction. The remainder of the macadam width is scarified and the material spread to form a better base under the new construction. This is only one example of so many successful operations of like reconstruction that it may be taken as a principle that if roads are well maintained when traffic becomes so heavy that reconstruction is necessary, the major part of the investment can be preserved and be built into the new highway as an integral part. It is my judgment that our heaviest traffic lines of the future will be developed in this manner, for we must recognize the principle that at the present time the big task is to get a mileage of surfaces that can be maintained under the traffic. Perhaps the principle that we should remember is to do the fundamental work right. Road surfaces are built for use and we must expect them to wear out. The one thing that we must do is to furnish highway service, for this is an essential factor of highway transportation, and we must rely on highway transportation to pay the major portion of the costs of the whole construction and maintenance program ahead.

Mail Boxes *on* Highways

LOCATION of rural mail boxes along the improved hard surfaced roads is the subject of a suggestion of the Fourth Assistant Postmaster General. The statement of the Fourth Assistant is as follows:

It has been brought to the attention of the Department that it is the practice of some postmasters and rural carriers to insist that the boxes of rural patrons shall be erected near the edge of the crown of hard surfaced roads. It is the experience that boxes so located are an obstruction and dangerous to traffic and seriously interfere with the operation of the machines used in the maintenance of roads of this character.

It is deemed essential that there be cooperation between the representatives of this Department and the authorities charged with the upkeep of the roads, and it is directed that postmasters shall, when requested by the state highway engineers or other competent authorities, require rural patrons to erect their boxes on the outer edge of the shoulder line of hard surfaced roads, and in such position at the edge of other roads, that they shall not be an obstruction or a menace to traffic, while at the same time being accessible to the carriers without the need of their leaving their conveyances.

"Although not a requirement, it is the opinion of the Department that it would be of advantage if persons having boxes on improved roads and on those over which there is heavy traffic would paint the post white, because it would add to their visibility at night and tend to reduce accidents."

Building *a* Road *on a* Feather Bed

(Continued from page 3.)

nects Western North Carolina with East Tennessee and Southwest Virginia. On the east it connects with Federal Aid Project No. 100, which extends through Avery County, via Cranberry, and on the western end as stated above it connects with State Project 855 which in turn joins with Federal Aid Project No. 96, Yancey County leading to Burnsville. The completion of this stretch of the State Highway System, approximately 27 miles in length, will open up and be a potent factor in the development of a section rich in minerals and timber, well suited to cattle-raising and apple growing. At Cranberry, Avery County, there are the Cranberry Mines from which quantities of iron ore are taken; at Plumtree there is a factory where mica is made into insulators, and other commercial forms; there are several feldspar mines in the section as well as other smaller mica mines where the product is simply mined and shipped in the crude state. Delicious apples of several well known varieties are grown to perfection but on account of the difficulties of getting the fruit to market quantities have been allowed to waste.

The accompanying photographs give a very good idea of the mountainous character of the territory through which Project 94-A is located. As constructed the the project will cost approximately $190,375.00, half of which will be paid from Federal Aid funds.

Rock Asphalt Section of Project 94-A, Through Town of Spruce Pine

STATUS OF FEDERAL AID WORK IN NORTH CAROLINA

Projects Under Construction

"H S" denotes any type of hard surfaced road.

"G" denotes any type of gravel, sand-clay, or topsoil road.

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
4	Craven	9.46	G	$ 21,089.23	10–12–19	County Commissioners
13	Wayne	12.573	G	101,467.23	5–25–20	County Commissioners
15	Guilford	4.205	H S	5,441.75	9- 1–17	County Commissioners
16	Haywood	14.27	G	64,705.05	7–26–19	County Commissioners
17	Wilkes	17.6	G	101,386.08	10–15–18	County Commissioners
49	Lenoir	6.017	H S	199,872.19	2- 9–20	T. H. Gill & Company—West Construction Co.
53	Lenoir	7.234	H S	246,838.20	7- 6–20	T. H. Gill & Company—West Construction Co.
58	Johnston	6.018	G	69,453.50	5–20–20	P. R. Ashby
60	Lenoir	7.88	H S	259,445.25	12–23–19	T. H. Gill & Company—West Construction Co.
61	New Hanover	2.186	G	234,841.39	7–12–20	C. W. Lacy
66	Haywood	6.18	G	105,296.45	9–15–20	O'Brien Construction Co.
68	Sampson-Harnett	27.4	G	305,225.54	7–23–20	P. R. Ashby—F. L. Grant, Inc.
69	Transylvania	9.348	G	231,409.04	3–25–20	Allport & Alexander Construction Company
70A	Jackson	4.83	G	150,081.11	6–18–20	Wright & Nave
73	Nash	8.73	G	159,913.16	1–20–21	Porter & Boyd
75	Columbus	7.06	G	66,605.38	12- 9–20	County Commissioners
86A	Martin-Bertie	3.09	G	98,454.67	2–25–20	State Forces (Road)
86B	Martin-Bertie		Bridges	332,308.83	3–19–21	Boyle-Robertson Construction Co.
90	Pamlico	12.03	G	127,981.78	1- 2–21	Eagle Engineering Company
93	Franklin-Warren	19.8	G	192,993.57	9–25–20	Chandler & Ragland—Stearns Bros.
94A	Mitchell	5.04	H S	190,375.13	6–22–20	Gibson Construction Company
96	Yancey	2.95	G	82,653.12	1- 3–21	Gibson Construction Company
98A	Moore	20.53	G	259,240.38	9–10–20	J. T. Plott—J. E. Lane & Co.
99B	Chatham	21.82	G	259,931.59	11–19–20	J. T. Plott—Atlantic Bridge Co. (Bridges)
101B	Randolph	9.64	G	107,928.75	11- 5–20	J. T. Plott—Hanford Bros. (Bridges).
103	Duplin	11.32	G	111,931.05	6–10–20	County Commissioners
117	Wilson	6.25	G	41,828.93	3- 8–21	County Commissioners—Lee J. Smith (Bridges)
120	Bladen	23.67	G	105,688.55	2–16–21	J. A. Marrow—P. R- Ashby (Bridges)
125A	Alleghany	4.99	G	153,899.13	11–22–21	W. E. Graham
127	Wilson	7.63	G	33,780.45	3- 5–21	County Commissioners—Lee J. Smith (Bridges)
136	Davie	6.99	G	61,733.04	2–14–21	Chandler & Ragland—Hagedorn Const. Co. (Bridges)

Projects Completed

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
1*	Mecklenburg		Bridge	$ 59,224.90	9- 5–18	C. W. Requarth & Company
2*	Henderson	7.75	G	33,141.74	12–17–19	State Convict Labor
3*	McDowell	2.85	G	24,405.73	12–17–19	County Commissioners
5*	Burke	8.03	G	19,888.05	11- 1–19	County Commissioners
8*	Cumberland	13.46	G	62,800.71	6–20–21	County Commissioners
9*	Polk	12.78	G	68,175.45	4–15–21	County Commissioners
11*	Lenoir	1.78	H S	56,893.18	1–25–21	West Construction Company
12*	Wayne	8.62	G	26,727.98	11- 2–20	County Commissioners
14*	Halifax	8.01	G	19,017.83	8–20–19	State Convict Labor
18*	Alexander	9.8	G	66,446.49	3–31–21	County Commissioners
19*	Rockingham	8.21	G	32,759.36	11–11–19	County Commissioners
20*	Yadkin	6.41	G	25,146.45	7–26–20	County Commissioners
21*	Person	7.675	G	25,911.04	3–15–20	County Commissioners
22A*	Alamance	1.196	H S	30,103.48	6–27–19	County Commissioners
22B*	Alamance	8.3	H S	290,179.36	8–19–21	Powell Paving and Construction Company
23*	Burke	7.68	G	42,873.90	11- 1–20	Lovelady Township Forces
24*	Wake	4.24	H S	127,840.21	11–30–19	W. W. Boxley & Company
25*	Person	8.175	G	101,537.51	10–20–20	County Commissioners
26*	Davidson	8.41	G	14,115.96	10- 1–19	County Commissioners
27A	Orange	8.235	G	53,945.73	4–23–21	W. S. & L. A. Crawford
29*	Union	8.655	G	58,949.25	4- 8–21	County Commissioners—J. S. Stearns
30	Mecklenburg	6.304	H S	102,551.35	3–31–21	County Commissioners
31*	Buncombe	3.1	H S	70,174.88	10–24–19	County Commissioners
33	Montgomery	3.72	G	15,246.71	6- 8–21	County Commissioners
34	Wayne		Bridge	50,798.00	10- 8–21	Roanoke Bridge and Iron Works, Inc.
35*	Forsyth	1.87	H S	59,867.61	2–25–20	County Commissioners
36*	Durham	3.46	H S	115,075.57	12–15–19	R. G. Lassiter & Company
37	Gaston	10.38	H S	167,173.23	12–28–21	County Commissioners
38*	Rockingham	10.92	G	46,809.92	9–17–20	County Commissioners
38A	Caswell	6.67	G	50,907.23	7- 6–21	Bolton Construction Co.
39	Union	10.61	G	74,337.71	4- 9–21	County Commissioners—J. S. Stearns
40*	Union	4.287	G	18,434.20	12–11–20	County Commissioners
41	Watauga	8.95	G	94,681.29	11–10–21	County Commissioners
42*	Stanly	11.67	G	80,922.15	9–10–20	Gibson Construction Company
43*	Beaufort	2.2	H S	95,089.12	5–11–20	Simmons Construction Company
44*	Granville	4.57	G	51,377.43	4–20–21	T. W. Chandler—P. R. Ashby
45	Buncombe	7.852	H S	359,777.28	7–23–21	H. A. Wells-Asheville Const. Co.—Asheville Paving Company
47*	Guilford	4.607	H S	162,689.83	4- 8–21	County Commissioners
48A*	Northampton	5.804	G	60,620.51	10–30–20	Virginia Contracting Company
48B	Northampton	2.69	G	44,749.65	10- 4–20	Porter & Peck–A. C. House
50*	Guilford	2.65	H S	101,596.44	12–31–20	County Commissioners

(Continued on next page)

STATUS OF FEDERAL AID WORK IN NORTH CAROLINA---*Continued*

Projects Completed (Continued)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
51	Guilford	2.26	H S	$ 87,603.12	9–27–20	County Commissioners
52	Cabarrus	8.986	G	162,399.61	3–22–21	Gibson Construction Co.—J. E. Lane
54*	Wake	6.811	H S	239,736.26	8–23–20	R. G. Lassiter & Company
55A*	Mecklenburg	6.008	H S	196,899.73	12–28–20	Simmons Construction Company, Inc.
55B	Mecklenburg	4.59	H S	188,445.18	8–13–21	Simmons Construction Co., Inc.
56*	Forsyth	5.868	G	47,709.31	10–29–20	C. B. Hester-Luten Bridge Company
57	Rowan	6.75	G	72,549.27	4–22–21	W. E. Graham—R. M. Hudson Company
59	Columbus	11.025	G	106,872.26	1–26–22	County Commissioners
62	Buncombe	3.43	H S	139,191.32	11– –21	H. C. McCrary, Inc.—Asheville Construction Co.
63	Buncombe	3.76	H S	167,933.55	9–20–21	Allport & Alexander Construction Co.—H. C. McCrary, Inc.—Asheville Paving Company
65	Pitt	9.57	G	99,181.06	10–20–21	Porter & Peck
67*	Nash	8.81	H S	384,126.08	4–20–21	R. G. Lassiter—Atlantic Bridge Company
71	Durham	6.69	H S	319,153.39	10–26–21	State Forces
72*	Anson	3.896	G	70,470.89	3– 4–21	Gibson Construction Co.—J. A. Kreis & Co.
74A*	Stanly	2.803	G	25,537.45	8–20–20	County Commissioners
74B	Stanly	4.92	G	63,411.26	5– –21	County Commissioners
76*	Cabarrus	1.35	H S	54,583.76	10–29–20	R. M. Hudson & Company
77	Rutherford	2.206	H S	100,159.44	9– 5–21	E. T. Belote
78A	Rutherford	9.64	G	88,230.71	8– 3–21	Ross Brothers.
78B	Rutherford	10.26	G	71,056.48	8– 3–21	Ralph E. Oliver
79*	Cleveland	1.645	H S	67,063.64	10–30–20	Noll Construction Company
80A	Montgomery	16.6	G	226,516.20	6–20–21	County Commissioners
80B	Montgomery	11.07	G	65,145.02	10–25–21	Lee J. Smith Const. Co.—P. R. Ashby
81	Pender	26.11	G	273,439.45	12– –21	Porter & Boyd
82	Davidson	4.54	G	59,983.71	12–18–20	Heilig & Sherrill
84A	Burke-McDowell	8.33	G	128,193.76	8– 3–21	J. A. Kreis & Company
84B	McDowell	6.76	G	109,659.49	8– 1–21	J. A. Kreis & Company
85*	Davie	8.28	G	58,756.89	9–26–20	W. E. Graham
91*	Surry	10.68	G	113,805.84	6–27–21	W. E. Graham—R. W. Curtis & Co.
92*	Surry	10.83	G	133,141.03	6–20–21	W. E. Graham—R. W. Curtis & Co.
98B	Moore	8.75	G	41,055 46	3—8–22	Lee J Smith Construction Co D
98C	Lee	4.53	G	18,240.64	10–29–21	Gibson Construction Co.
99A	Chatham	12.65	G	126,717.70	8–11–21	T. W. Chandler—State Forces (Bridges)
100	Avery	14.00	H S	272,089.78	11– –21	Southern Dray Company
101A	Randolph	10.04	G	123,893.99	8–12–21	S. L. Davis—J. A. Kreis & Co. (Bridges)
105	Hoke	9.8	G	95,501.80	10–25–21	Jameson Brothers—George, Hankins & George
107	Madison	2.46	G	70,910.40	10– –21	Southern Dray Company
109	Burke	3.58	G	55,191.64	5–21–21	C. E. Teague
111	Forsyth	12.22	G	94,447.10	8–17–21	C. B. Hester—Heilig & Sherrill
112	Caswell	11.93	G	147,065.71	11– 2–21	J. M. Gregory—J. E. Lane & Co. (Bridges).
114*	Rowan	2.543	H S	83,587.02	3–17–21	R. M. Hudson & Company
116	Stanley-Montgom'	....	Bridge	199,614.80	1– 9–22	Cornell-Young Company
121	Stokes	11.60	G	108,519.62	1–14–22	Jameson Bros.—Rogers & Shumway (Bridges)
129	Richmond	17.28	G	77,507.48	12– –21	Mulligan & Roach

*Final Settlement Made With Federal Government

STATUS OF STATE WORK IN NORTH CAROLINA

Projects Under Construction

"H S" denotes any type hard surfaced road. "G" denotes any type of gravel, sand clay, or topsoil road.

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
100	Beaufort	10.50	H S	$ 369,777.70	8–23–21	W. T. Hadlow.
113	Chowan	10.32	G	40,975.73	2—1–22	Nello L. Teer—P. R. Ashby.
114	Chowan	10.00	G	45,064.09	1—4–22	Battershill & Goode—Chandler & Ragland.
125	Edgecombe	15.11	H S	428,438.76	2—28–22	R. G. Lassiter & Co.
137	Halifax	5.67	H S	124,736.97	10–31–21	O. F. Leighton—A. C. House.
139	Halifax	....	Bridge	18,436.66	10–11–21	Chandler & Ragland—Porter & Peck.
151	Hyde	4.30	G	71,422.78	12–10–21	C. W. Lacy—Porter & Peck.
155	Martin-Pitt	20.00	G	98,176.65	1–12–22	J. P. Dicus—P. R. Ashby.
159	Nash	11.22	G	89,942.43	1—2–22	J. A. Kreis & Co.
160	Franklin-Wake-Nash	9.83	G	53,722.95	1–27–21	Chandler & Ragland—Southern Dray Co.
166	Northampton	0.47	G	17,954.75	3-20–22	W. D. Murray-Sadler Corp.
175	Pasquotank	9.50	H S	217,405.72	4—6–21	County Commissioners.
183-B	Pitt	....	Bridge	32,343 30	3-27–22	B. J. Boyles.
185	Pitt	14.35	G	31,069.72	3-28–22	J. A. Marrow.
186	Pitt	9.75	H S	260,816.60	9–20–21	Cheatwood & Driscoll.
191	Tyrell	6.91	G	57,934.41	1–20–22	C. W. Lacy—M. M. Jones.
195	Washington	15.18	G	65,619.35	2–27–22	L. M. Lee & Co.—B. J. Boyles.
209	Craven	2.65	H S	115,688.21	8–00–21	Eagle Engineering Co.
218	Wayne-Duplin	16.06	G	80,804.50	8—4–21	C. W. Lacy.
227	Greene	6.81	H S	283,113.70	12–19–21	West Const. Co.—Union Paving Co.
280	Wayne	10.01	H S	311,352.36	11–28–21	Union Paving Company.
281	Wayne	....	Bridge	22,484.88	....	P. R. Ashby.
301	Bladen	13.17	G	82,028.21	11–12–21	J. F. Mulligan—Powell Paving & Cont. Co.
313	Brunswick	3.44	H S	105,389 85	3–15–22	Sou. Willite Paving Co —Roanoke Bridge & Iron Works
314	Brunswick	15.82	G	99,326.45	2–23–22	Hagedorn Const. Co.

(Continued on next page)

STATUS OF STATE WORK IN NORTH CAROLINA—*Continued*

Projects Under Construction (Continued)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
325	Columbus	11.22	G	$ 105,258.23	11—3-21	J. A. Kreis-Cornell-Young Co.
338	Cumberland-Sampson	....	Bridge	26,233.99	10-28-21	Roanoke Bridge & Iron Works.
339	Harnett-Cumb'l'nd	....	Bridge	16,524.75	11-30-21	Porter & Boyd.
364-A	Onslow	9.95	G	44,631 40	3-14-22	R E Martin
375	Pender	15.56	G	72,522.92	11—1-21	A. W. McClay.
376	Pender	7.64	G	94,757.85	11-11-21	C. G. Kershaw Const. Co.—Cornell Young Co.
377	Pender-Duplin	1.61	G	76,985 70	3-22-22	R. E. Martin-Hazell-Connerat-Quist Co.
388	Robeson	3.35	H S	137,009.40	11-10-21	C. W. Lacy—Roanoke Bridge & Iron Works.
389	Roberson-Colum	1.56	G	83,463.38	10-26-21	L. A. Chitwood.
411	Durham	5.81	H S	211,574.92	9—1-21	Hutton Eng. & Const. Co.
427	Granville	5.12	H S	159,097.62	12- 1-21	R. G. Lassiter & Co.
436	Harnett	21.19	G	144,318.14	6-28-21	C. G. Kershaw Const. Co.—Hobbs & Kitchen.
454	Orange	4.29	H S	192,006.15	6-18-21	Elliott, Sholes & Teer
455	Orange	4.19	G	46,415.77	11-28-21	J. F. Mulligan Const. Co.—P. R. Ashby.
456	Orange	9.00	G	37,459.07	1- 7-22	Crawford & Crawford—Nello Teer.
482	Wake	6.64	H S	191,669.21	12- 8-21	R. M. Hudson Company.
501	Alamance	13.10	G	32,627.10	12- 7-21	W. M. Shook—Hanford Bros.
511	Caswell	14.8	G	74,192.58	12-12-21	White & Simpson—C. B. Hester.
525	Davidson	10.24	H S	363,141.68	12-23-21	Elliott & Sons & Boggs—Austin Bros. BridgeCo.
526	Davidson	3.77	H S	130,826 19	3—4-22	Hagedorn Const. Co.—Heilig & Sherrill.
532	Guilford	11.70	H S	387,499.20	2—1-22	Elliott-Sholes Company.
533	Guilford-Forsyth	10.59	H S	427,997.62	7-11-21	Royer-Ferguson Const. Co.
566	Moore	7.14	G	61,380 66	3—6-22	Gibson Const. Co —Nello Teer.
606	Stanley-Anson	....	Bridge	54,759 32	3-23-22	Concrete Steel Bridge Co.
607	Anson	6.39	G	40,517 29	3-21-22	Geer & Wilson—Booz-Lloyd & Co.
630	Gaston	3.02	H S	98,392.36	10-12-21	W. F. McCanless.
632	Gaston	9.5	H S	291,868.94	1—2-22	Davis-Wilcox Const. Co.
638	Iredell	7.88	H S	244,509.30	10-12-21	Thompson-Caldwell Co.
639	Iredell	10.59	H S	387,448.42	1—2-22	R. M. Hudson Co.—Luten Bridge Co.
655	Mecklenburg	1.57	H S	62,027.68	12-21-21	Speed-Parker Co., Inc.—Luten Bridge Co.
657	Mecklenburg	13.8	G*	20,000.00	12- 8-21	State Forces.
700	Alleghany	7.90	G	132,297.33	6-23-21	W. E. Graham
701	Alleghany-Wilkes	8.00	G	153,863.60	6-16-21	W. E. Graham
710	Ashe	3.14	H S	142,687.93	9- 8-21	Pittman Const. Co.
725	Caldwell	2.4	G*	10,000.00	12-29-21	County Commissioners.
731	Davie	5.46	H S	195,393 11	3-13-22	G. R. Martin-Heilig & Sherrill.
750	Stokes	14.86	G	93,054.48	9-15-21	J. F. Mulligan Const. Co.—Lee J. Smith
751	Stokes	7.25	G	31,746.00	10- 4-21	W. E. Graham
760	Surry-Wilkes	6.91	G	24,387.66	2-10-22	W. E. Graham.
780	Wilkes	18.00	G*	25,000.00	7-25-21	J. F. Mulligan.
781	Wilkes	14.50	G*	30,000.00	7-25-21	J. F. Mulligan.
782	Wilkes	5.97	H S	184,614 65	3-29-22	Hyde & Baxter.
783	Wilkes-Watauga	34.40	G*	80,000.00	9- 2-21	Chandler & Ragland.
811	Burke	6.0	H S	189,412.41	1-13-22	Southern Dray Company.
823	Cleveland	2.0	H S	81,234.01	1—2-22	Southern Paving Co.—Z. B. Weathers & Son.
833	Henderson	10.22	G	38,412.44	1—3-22	S. L. Davis Const. Co.—Asheville Const. Co.
845	McDowell	7.19	G	132,177.93	9- 6-21	J. W. Stapp Const. Co.—Praytor, Howton Wood. Const. Co.
846	McDowell	10.06	G	204,680.74	9-12-21	Asheville Const. Co.—W. T. Taylor Const. Co
855	Mitchell	4.97	H S	174,393.78	9-12-21	Fiske-Carter Construction Co.
856	Mitchell	4.0	H S	239,005 80	3-20-22	Porter & Boyd—L. J. Chandler & Co.
877	Rutherford	9.79	G	64,563.73	5-31-21	Geer & Wilson
878	Rutherford	6.55	G	50,913.50	9-22-21	Michaux Const. Co.—Geer & Wilson.
879	Rutherford	....	Bridge	5,737.38	1—9-22	Austin Bros. Bridge Co.
904	Buncombe	1.60	H S	81,079 35	3-13-22	Asheville Paving Co.—R. C. Stevens
910	Cherokee	7.56	G	76,743.59	5-24-21	Ross Bros.—W. T. Moore Conc. Prod. Co.
911	Cherokee	10.33	G	84,475.38	10-25-21	H. A. Wells—Southern Dray Co.
920	Clay	4.8	G	54,875.81	1—9-22	E. A. Wilson & Co.—W. T. Moore Conc. Prod. Co.
921	Clay	12.37	G	123,929.52	10-24-21	Lee J. Smith Const. Co.—W. T. Moore Conc. Prod. Co.
930	Graham	12.90	G	130,522.00	10-15-21	Lee J. Smith Const. Co., C. M. Dicus.
950	Jackson	7.56	G	145,313.30	6-13-21	Wright & Nave—O'Brien Const. Co.
960	Macon	4.97	G	69,100.57	6- 6-21	J. T. Plott—J. E. Lane & Co.
961	Macon	4.77	G	58,340.59	12- 5-21	J. T. Plott—J. E. Lane & Co.
970	Madison-Yancey	13.80	G	267,378.26	10-11-21	R. H. Wright & Sons—O'Brien Const. Co.

Projects Completed

500	Alamance	5.22	G	32,732.20	1-17-22	W. W. Tuck & Son—A. M. Hazell, Connerate—Quist Const. Co
692	Union	2.28	H S	65,366.67	12-28-21	Redmon Construction Co.
722	Caldwell	7.00	G*	12.000.00	1-18-22	County Forces.
844	McDowell	1.80	H S	57,048.42	12-28-21	Bolton Construction Co.
942	Haywood	0.57	G	5,294.46	2-1-22	O'Brien Construction Co.

*Reconstruction only.

STATUS OF STATE WORK IN NORTH CAROLINA---*Continued*

PROJECTS UNDER CONTRACT

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	CONTRACTOR
138A	Halifax-Northampton	12.59	G	131,712 13	Nello Teer—Richards Bros
140	Halifax	....	Bridge	$ 10,542.69	Von Glahn & Talbott.
154	Martin	11.27	H S	394,090.74	Sou. Willite Paving Co.—O. F. Leighton, Inc.
196	Washington	14.93	G	82,099.60	W. N. Thompson—Nello L. Teer.
210	Craven	8.34	H S	287,919.39	Union Paving Co.—A. P. Gilbert.
211	Craven	9.93	H S	262,673.20	Union Paving Co.
245	Jones	15.76	H S	244,737.90	Hyde & Baxter.
263	Pamlico	12.03	H S	289,324.20	Union Paving Company.
272	Sampson	16.47	G	98,807.39	R. E. Martin–Striblin–Stauddy & Newell.
291	Wilson	7.63	H S	203,493.18	P. R. Ashby.
300	Bladen	11.99	G	65,178.90	T. W. Chandler—Nello Teer.
378	Pender	13.59	H S	213,502 96	C. W. Lacy.
400	Chatham	....	Bridge	57,420.22	R. M. Walker & Co.
409	Durham	0.5	H S	6,140.64	J. P. Dicus.
410	Durham	2.3	H S	83,921.97	C. D. Riggsbee.
428	Granville	4.19	H S	142,637 77	Pittman Const Co
445	Lee	5.91	G	16,240 95	C. B. Hester.
453	Orange	....	Bridge	33,706.80	Geo. W. Kane.
481	Wake	7.20	H S	252,925.15	Union Paving Co.—P. R. Ashby.
483	Wake	0.54	H S	19,989.75	C. D. Riggsbee.
492	Warren	4.49	H S	100,436 13	Porter & Peck—A C House.
493	Warren	3.88	H S	77,866 80	Porter & Peck.
504	Alamance	5.22	H S	154,127.16	Elliott–Sholes Company.
505	Alamance	0.42	H S	15,316.40	Hedrick Construction Co.
538	Guilford	....	Bridge	7,555.90	J. L. Brinkley.
539	Guilford	0.6	H S	21,639 20	R. G. Lassiter & Co.
544	Hoke	10.45	G	32,445 49	O. A. Mann & Co.—J. T. Pigg.
567	Moore	2.96	G	7,690.43	C. E. Teague.
577	Randolph	13.37	H S	411,375.77	Royer–Ferguson Co., Inc.—J. L. Brinkley.
588	Rockingham	7.98	H S	266,498 43	Cheatwood & Driscoll
601	Alexander	3.07	G	33,630.45	Gus Ginn, Inc.—R. M Thurmond.
622	Catawba	10.85	H S	354,684.88	Union Paving Company.
653	Mecklenburg	8.84	H S	308,182.44	Union Paving Co.—Luten Bridge Co.
654	Mecklenburg	10.1	H S	302,887.09	Lampton & Burks.
677	Scotland-Robeson	7.11	H S	283,460 21	P. R. Ashby—Chitwood & Palmer.
695	Union	4.3	H S	123,865.28	Redmon Const. Co.
724	Caldwell	4.66	G	51,890.66	County Road Comm.—R. M. Thurmond.
790	Yadkin	10.12	H S	308,123.42	Pittman Const. Co.
801	Avery	0.99	H S	22,350.24	Geer & Wilson.
855-B	Mitchell	....	Bridges	7,454.15	Luten Bridge Co.
860	Mitchell	5.58	H S	152,908.42	J. F. Mulligan—W. H. Anderson Const. Co.
866	Polk	5.96	H S	180,393.40	Dunn & Woodall—Henry Const. Co.
880	Rutherford	....	Bridge	24,679.43	Austin Bros. Bridge Co.
903	Buncombe	2.58	H S	100,399 47	Asheville Paving Co.—R. C. Stevens.
940	Haywood	7.13	H S	126,082.00	Alexander & Patton—H. A. Brown & Co.
951	Jackson	11.85	H S	249,546 00	R H Wright & Sons—W. T. Moore Conc Prod. Co.
980	Macon–Swain	17.9	G	344,161.29	E. A. Wilson & Co.—Southern Dray Co.

Summary

	NUMBER OF PROJECTS			MILEAGE		APPROXIMATE TOTAL COST		
	H S	G	BRIDGE	H S	G	H S	G	BRIDGE
UNDER CONSTRUCTION								
Federal Aid Projects	5	25	1	30.38	276.37	$ 901,972.52	$3,249,518.17	$ 332,308.83
State Projects	31	50	7	200.65	521.87	6,789,609.60	3,850,348.54	176,520.28
Total Under Construction	36	75	8	231.03	798.24	7,691,582.12	7,099;866.71	508,829.11
UNDER CONTRACT Construction not yet begun								
Federal Aid Projects	....	....	....	....	....	....	....	....
State Projects	31	10		214.65	100.93	5,961,499.59	863,857.29	141,359.19
Total Under Contract	31	10	6	214.65	100.93	5,961,499.59	863,857.29	141,359.19
COMPLETED								
Federal Aid Projects	26	56	3	122.05	486.43	4,039,583.81	4,149,041.21	309,637.70
State Projects	2	3	....	4.08	12.79	122,415.09	50,026.66	....
Total Completed	28	59	3	126.13	499.22	4,161,998.90	4,199,067.87	309,637.70

(Continued on next page)

SUMMARY—Continued.

Total mileage of Hard Surface work under construction or contracted for		445.68
Total mileage of Topsoil, Sand Clay or Gravel work under construction or contracted for		899.17
Total mileage under construction or contracted for		1,344.85
Total cost of Hard Surface work under construction or contracted for	$	13,653,081.71
Total cost of Topsoil, Sand Clay or Gravel work under construction or contracted for		7,963,724.00
Total cost of Bridge work under construction or contracted for		650,188.30
Grand Total cost of work under construction or contracted for	$	22,266,994.01
Total mileage of Hard Surface work completed		126.13
Total mileage of Topsoil, Sand Clay or Gravel work completed		499.22
Total mileage of work completed		625.25
Total cost of Hard Surface work completed	$	4,161,998.90
Total cost of Topsoil, Sand Clay, or Gravel work completed		4,199,067.87
Total cost of Bridge work completed		309,637.70
Grand Total of all work completed	$	8,670,704.47

Corrected to April 1, 1922

The Song *of the* Draftsmen

We do the very best we can,
We would not think of less.
The checker doesn't give a damn;
He says our stuff's a mess.
Oh it's rub rub rub rub,
Until we are very wroth,
And it's scrub scrub scrub scrub;
A hole wears in the cloth.
No matter what we try to do,
We never can be right.
Office practice, old and new,
Changes over night.
We do our very level best,
To make the bridges strong.
The checker then he does the rest;
He says the comp's are wrong.
Oh it's rub rub rub rub,
Until our hands are sore.
And it's scrub scrub scrub scrub,
The checker rings some more.
And when the changes all are made:
The checker's name's in ink.
The road department changes grade:
The job's all on the blink.
We send our tracings clean and white,
To checkers to be checked.
When they come back they are a sight;
They surely have been wrecked.
Oh it's rub rub rub rub,
Until our arms are numb.
And it's scrub scrub scrub scrub,
The sheet's all on the bum.
And when the checker signs his name,
And says the sheet will pass,
Don't think we've finished up the game
Until its cleaned with gas.

Announcing--

Slaughter Culvert Company

Offices 300-301 Masonic Temple Building
RALEIGH, N.C.

Corrugated Culvert Concrete Culvert

"Newport Genuine Open Hearth Iron."

STEEL BUILDING MATERIALS

FOR

BRIDGES *and* BUILDINGS

Immediate Shipments

CONCRETE
REINFORCING BARS

FROM OUR

Charlotte Warehouse

National Steel Lumber
Lupton Steel Windows
Kinear Doors
Coal Chutes
Ornamental Iron Work

*SOUTHERN
ENGINEERING
COMPANY*

CHARLOTTE, N. C.

*Write for complete information
and estimates*

NATIONAL CAST-IRON LOCK-JOINT

Long Years *of* Life Ahead *of* Them

National Lock-Joint Cast-Iron Pipe

The Pipe *of* Short Units, Long Service *and* Low Costs

The Pipe that locks effectively, that prevents Separation and assures alignment to perfection.

The pipe which solves culvert renewal problems with least expense, greatest efficiency. The pipe that does not rot or disintegrate, the pipe that is mechanically correct and has proved itself the solution of the culvert problem.

CONTRACTORS *and* ENGINEERS, GET THIS:

TWO MEN, without the use of any tools whatsoever, will unload, handle and install all sizes up to and including 36 inches in diameter.

It is as cheap to handle and install as clay pipe WITH NO BREAKAGE LOSS. In shallow trench work the entire culvert can be built up, interlocked and rolled into place in one operation.

AMERICAN
CASTING CO.
Birmingham, - - Alabama

T. B. TURNER & CO.
Raleigh, : : North Carolina

LEHIGH
CEMENT

GOOD MATERIAL
FOR A
GOOD ROAD
IS ESSENTIAL

LEHIGH PORTLAND CEMENT
has been used in the construction of
some of the best highways in the
country because of its

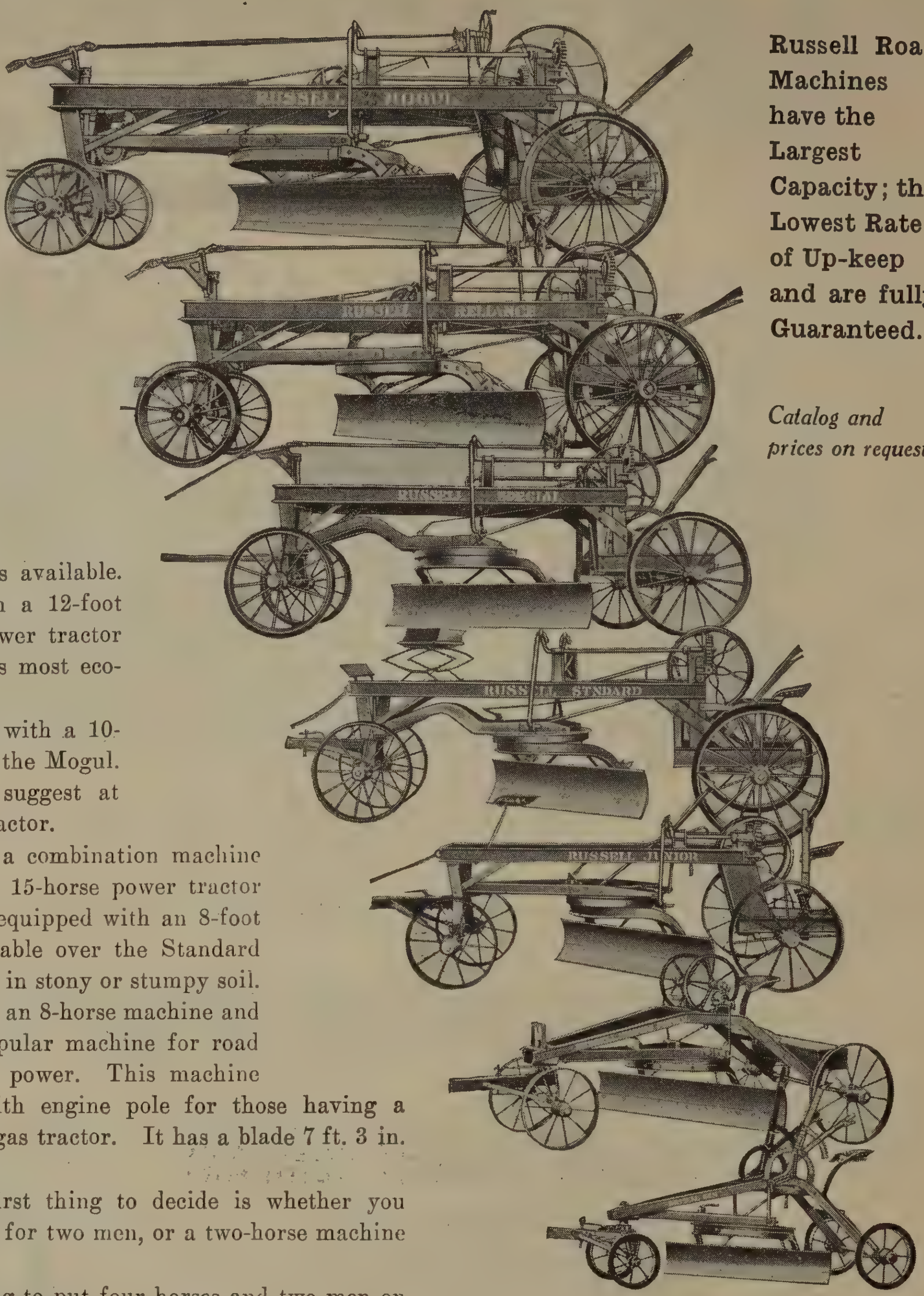
Quality and the Service of the

LEHIGH PORTLAND CEMENT COMPANY
ALLENTOWN, PA.
RICHMOND, VA.

OFFICES *and* MILLS
from
COAST *to* COAST

LEHIGH
LEHIGH PORTLAND CEMENT CO.
LEHIGH
ALLENTOWN, PA. ~ CHICAGO, ILL.
LEHIGH
95 Lbs. Gross · 94 Lbs. Net

A RUSSELL ROAD MACHINE FOR EVERY NEED



Russell Road Machines have the Largest Capacity; the Lowest Rate of Up-keep and are fully Guaranteed.

Catalog and prices on request.

Before deciding upon a road machine let us assist you by suggesting what we consider best for your requirements. We make this offer because we know that this is one of your problems. The first thing to decide upon is whether you want a machine for construction or maintenance; for horse power or tractor power.

For Construction buy the largest machine for which power is available. The *Russell Mogul* with a 12-foot blade and a 25-horse power tractor will construct your roads most economically.

The *Russell Reliance,* with a 10-foot blade, ranks next to the Mogul. With this machine we suggest at least a 20-horse power tractor.

The *Russell Special* is a combination machine for which you may use a 15-horse power tractor or 8 or 12 horses. It is equipped with an 8-foot blade and is often preferable over the Standard for use with animal power in stony or stumpy soil.

The *Russell Standard* is an 8-horse machine and is, no doubt, the most popular machine for road construction with animal power. This machine may also be equipped with engine pole for those having a small 8 to 15-horse power gas tractor. It has a blade 7 ft. 3 in. long.

For Maintenance the first thing to decide is whether you want a four-horse machine for two men, or a two-horse machine for one man.

For those who are willing to put four horses and two men on the grader, the *Russell Junior* will do maintaining work more effectively than any other grader. This machine has a 6-foot blade and may be used for light road construction as well as maintenance.

The *Russell Hi-Way Patrol* grader is built especially for greatest efficiency in patrol and maintenance work with two horses and one man. It is lighter than the Junior and is equipped with a 6-foot blade. Blade is operated by worm and gear lift, giving the finest kind of adjustment.

The *Russell Gem* is the cheapest of the high-framed type machines. It is equipped with 5-foot, one-piece, reversible blade. The blade is operated by lever. It is a one-man, two-horse machine.

E. F. CRAVEN, "THE ROAD MACHINERY MAN"
GREENSBORO, NORTH CAROLINA
STATE DISTRIBUTOR
COMPLETE LINE OF MACHINES AND REPAIRS IN STOCK

We are Distributors for Virginia, North and South Carolina for the Following New Equipment:

Air Compressors, Locomotives, Street Cleaning tools and machines, Road pumps, Trench pumps, Steam pumps, Sand pumps, Steam, electric and gasoline hoists, Cranes of all types, Fire apparatus, Asphalt tools, Motor trucks, Trailers, Pavers, Building Mixers, Light mixers, Concrete chute systems—complete, Mortar mixers, Saw rigs, Graders, Asphalt pumps and distributors, Dump bodies, Conveyors, Elevators, Road Graders, Crushers, Scarifiers. fiers.

We have a full line of used machinery a great deal of which is owned outright by us and has been fully rebuilt in our own shops in Norfolk.

If you want anything in the way of used machines that must be about as good as new write us.

At this time we have going through our shops, rebuilding, the following:

Ten ton steam roller, Five ton tandem roller, One bag light mixer, 3½ ton Kelly Truck, Monarch Tractor, Three hoisting engines, Two air compressors, Pipe threading machine, 44 ins. engine lathe, 5 ton Alco Truck, 5 drill presses, No. 3. Keystone shovel, one paving mixer, etc., etc., etc.

We have a full line of slightly used plants on which we can save you money.

Let us have your inquiries.

We have a number of good pieces of plant that we will rent to responsible people.

This will save you buying equipment for the small contracts.

We have to rent now: No. 3 Keytone Hoisting engine D. C. 7 x 10, D. D. with boiler. Ten ton steam roller, Five ton tandem roller, 30 h. p. crawler type tractor, Thew Steam shovel, Two small air compressors with gasoline engines, Air compressor with electric motor, 21-S Mixer with boiler, engine, sideloader and tank, One-bag gasoline mixer loader and tank, 1250 yard Asphalt plant-complete.

All above plant is our own property and fully guaranteed.

Write us for terms.

We can use a few good sub-agents in the larger towns in all three states. If you visit contractors and can sell machinery we can put you in position to make some good extra money.

Sixteen years in business—our customers our references

LEWTER F. HOBBS, INC.

NORFOLK, VA.

Offices and show rooms
113-115 East Twelfth St.

Private Telephone Exchange
23908

Machine shops
835-837 West 38th. St.

Permanent Construction Concrete **Minimum Maintenance**

Solves the Road Problem

The concrete road is gaining in favor in all parts of the United States. Whether laid in North or South, East or West, in all varieties of climate and under widely varying conditions, the concrete road is meeting with success and is solving the problem of securing a roadway at reasonable cost that will stand up under modern traffic conditions.

Public approval and appreciation of the concrete road is based upon practical observation as to its extreme utility, reasonable first cost and the almost negligible outlay required for maintenance.

The most important question in road building today is that of maintenance.

The one aim and desire of road officials and engineers has been to find a material, the use of which would keep maintenance charges at a minimum.

In Bellefontaine, Ohio, the maintenance cost of a concrete road put down 20 years ago has averaged only one-fourth of a cent per square yard per year.

In Wayne County, Michigan, the maintenance on 60 miles of concrete road laid 1909 to 1912 was less than one-sixth of a cent per square yard for three years.

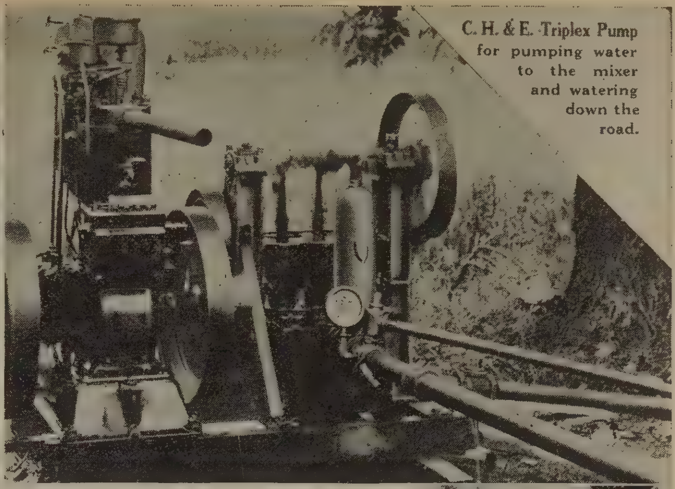
Concrete, therefore, completely answers the maintenance question.

And this combined with reasonable first cost makes it the ideal material for a modern road to meet modern conditions.

CLINCHFIELD PORTLAND CEMENT CORP.

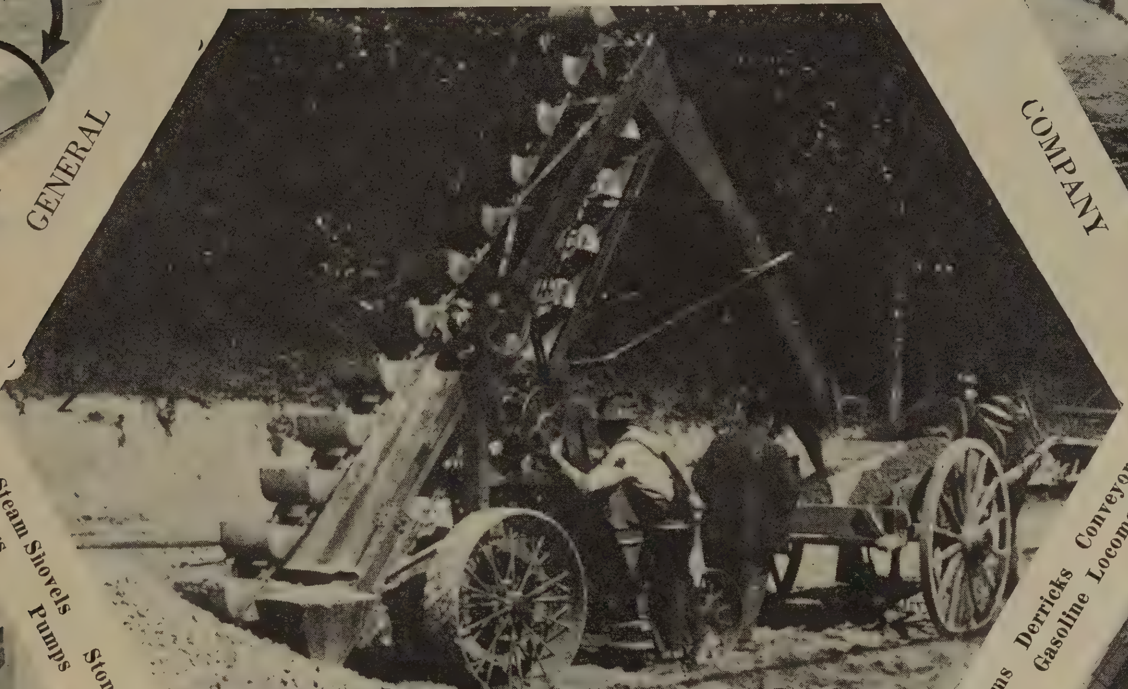
Office and Mills: KINGSPORT, TENN.

HELTZEL STEEL ROAD FORMS "BUILT LIKE A RAIL ROAD".



C. H. & E. Triplex Pump for pumping water to the mixer and watering down the road.

GENERAL UTILITIES COMPANY



This Barber-Greene Loader replaced 13 laborers. See one with crawler traction on the Norfolk-Virginia Beach Road.

Steam Shovels
Mixers
Pumps
Stone Loaders
Hoists

Conveyors
Derricks
Gasoline Locomotives
Steel Forms
Cranes

NORFOLK, VA.

Plymouth Gasoline Locomotive Speeding up delivery to the Paver.

BYERS "AUTO-CRANE" loading gravel into dump truck using ¾-yard bucket.

GEO. E. HOPPE, PRES. GRAHAM B. BRIGHT; V.-P. and SALES MGR.

Tractor & Machinery Sales Co.

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RICHMOND *VIRGINIA*

We Offer You the Following Lines:

HOLT "CATERPILLAR" *TRACTORS*

LAKEWOOD ENGINEERING CO.

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LAKEWOOD-MILWAUKEE MIXERS
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ROAD PLOWS
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MOTOR PICK-UP SWEEPERS
STREET SWEEPERS
STREET SPRINKLERS

PAWLING & HARNISCHFEGER CO.

BAKER MANUFACTURING CO.

Baker--Maney Wheelers

We also offer a full line of Slow Speed Trailers for all purposes; in fact, anything it takes to build or maintain a Street or Road.

Fort Fisher Highway, New Hanover Co., N. C. Treated with "Tarvia-B" 1915-17-18-19 and "Tarvia-A" in 1916.

Above is Wrightsville Turnpike, New Hanover Co., N. C. Treated with "Tarvia-A" 1915, and with "Tarvia-B" 1917.

Another view of Fort Fisher Highway.

"The Best Investment The Board Ever Made"

Mr. Addison Hewlett, Chairman of the Board of Commissioners of New Hanover County, N. C., writes, under date of July 25, 1921:

Tarvia
For Road Construction Repair and Maintenance

"We have been using Tarvia for surface treating the macadam roads of New Hanover County for the past six years, and we find this treatment satisfactory in every respect.

"Before we started the use of Tarvia we had great difficulty in maintaining our roads, as they became very dusty in dry weather and washed away in wet weather, leaving our road surface full of holes and ruts. Since using Tarvia the surface of the roads has been well protected in all kinds of weather, and today our roads have smooth, hard surfaces and our maintenance problem has been very easily solved. The Tarvia treatment is very inexpensive.

"It is unquestionably the best investment the Board of Commissioners has ever made and the Commissioners would not consider for a moment discontinuing Tarvia on our roads."

Additional comments on Tarvia are made by R.. A. Burnett, County Superintendent of Roads:

"Tarvia treatments are given to some of our roads every year while other roads, such as the Wrightsville Turnpike, have lasted as long as three years before requiring another treatment.

"These treatments have cost us in the neighborhood of $300 per mile per year and have proved to be the best, easiest and cheapest method of maintaining our roads. We have always had the best of co-operation from your engineers . . .

"We feel that we have a finer system of roads than any other county in the State."

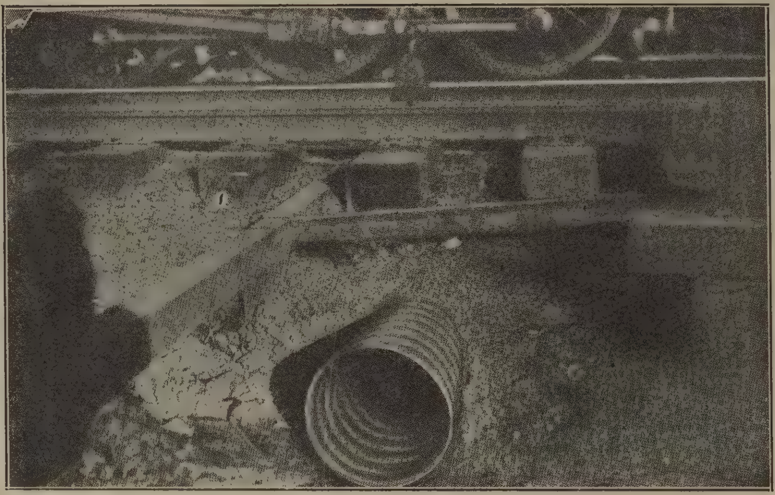
No matter what your road problems may be—new construction, maintenance, or repairs—there is a grade of Tarvia made especially for the purpose.

Write for free illustrated booklet describing the various uses of Tarvia

36th and Grey's Ferry Avenue The *Barrett* Company **Branches in All Leading Cities** TRADE B MARK **PHILADELPHIA, PA.**

PURE IRON LASTS LIKE THIS

Pure iron nails from coffin of soldier buried at Fort St. Clair, Ohio, U. S. A. After being 100 years in the ground, they are practically undamaged by rust. Analysis shows them to be 99.83% pure iron, containing only the merest traces of carbon, copper and sulphur.



The Engineer of the Atlanta Terminal Company says that the Armco Culvert pictured here is in such good condition today that it ought to last several times the ten year period during which it has already withstood the acid waters which go thru it in the Railroad yards, as well as the pounding of the 450,000 heavy trains which have gone over it.

AMERICAN
ARMCO
INGOT IRON

THE DIXIE CULVERT AND METAL COMPANY

Little Rock, Ark. **ATLANTA, GA.** Jacksonville, Fla.

J. GRANVILLE BALDWIN,
Charlotte, N. C.

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Lakeview, N. C.

NORTH STATE CULVERT *and* MACHINERY COMPANY

217 Lewis Street

TELEPHONE 2933

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Greensboro, North Carolina

GENERAL LINE OF ROAD BUILDING MACHINERY, CONTRACTORS' EQUIPMENT AND CULVERTS. A NEW NORTH STATE FIRM BUT OLD IN EXPERIENCE IN SUPPLYING WHAT YOU WANT.

LET US KNOW YOUR WANTS

FOOTE BUILT THE FIRST PAVER
WITH CATERPILLAR TYPE TRACTION

And having gone entirely through the experimental stage now offers to contractors the perfected "MultiFoote"

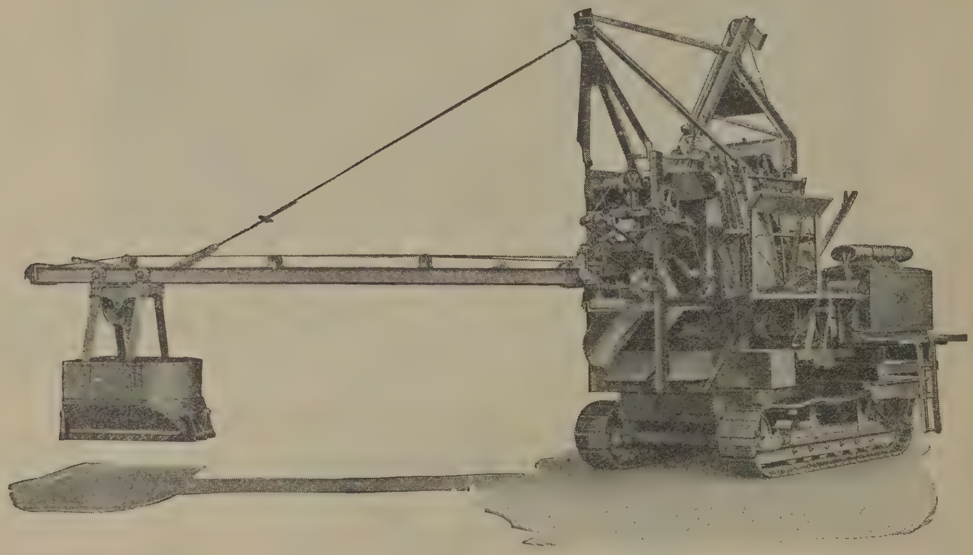
CONSIDER THESE FEATURES:

1—No planking or delays in moving, made possible by full length cast steel self-cleaning tread.

2—Absolute one-man control; from high operating platform, thus giving operator full view of all operations.

3—Fast mixing and discharging, due to patented double cone drum

4—Thoroughly dependable heavy duty skip hoist, (developed from suggestions of North Carolina contractor.)

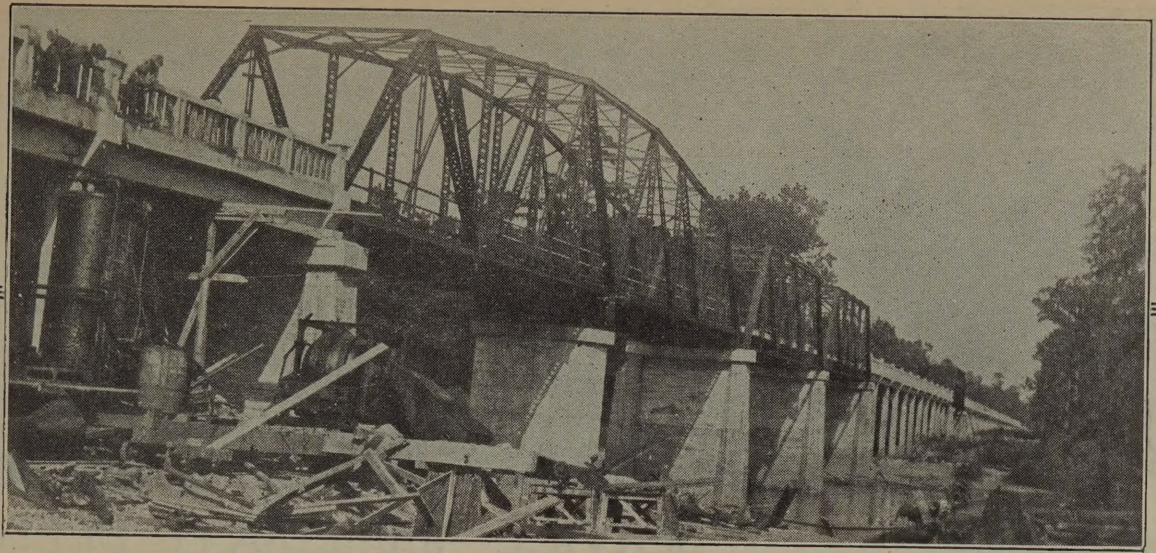


"A MultiFoote User is a MultiFoote Booster"

Built in two sizes---14 E and 21 E, with boom and bucket or gravity chute
with steam or gas power

GENERAL SOUTHERN AGENT
BURTON FRANKLIN, Chattanooga, Tenn.

NORTH CAROLINA AGENT
E. F. CRAVEN, "The Road Machinery Man," Greensboro, N. C.



Ga. Fed. Aid Project No. 8—Slag concrete bridge over the Oconee river near Mt. Vernon, Ga. Total length including approaches, 3187 ft. (between abutments 2378 ft.)—the largest and longest bridge in entire Eighth Federal District. Built by C. T. Dawkins Construction Co,. of Jacksonville, Fla.

This answers the query

Can you build good concrete bridges with

"ENSLEY" & "ALA CITY"

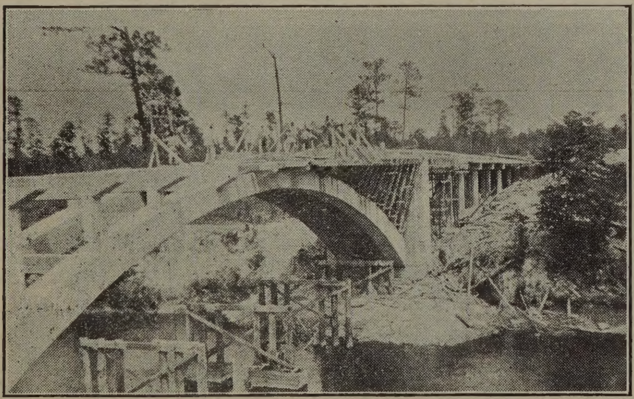
BASIC SLAG

CRUSHED & SCREENED

Ga. Fed. Aid Proj. No. 12—Slag Concrete bridge 1228 ft. long over the Ochlochnee river near Thomasville, Ga. Built by Cornell-Young Co., of Macon, Ga.

These three immense bridges are typical of the splendid structures that are being built in Georgia under State and Federal Aid direction. These bridges have no wooden floors that must be regularly replaced. They do not require painting. They will grow stronger as they grow older. For all of them are of the modern Reinforced concrete type.

Georgia believes firmly in concrete bridges. She also believes firmly in our Basic Slag as the coarse aggregate for the concrete in her bridges. For experiments have indicated—and experience has proved—that Slag Concrete stands highest both in compression and tensile strength.

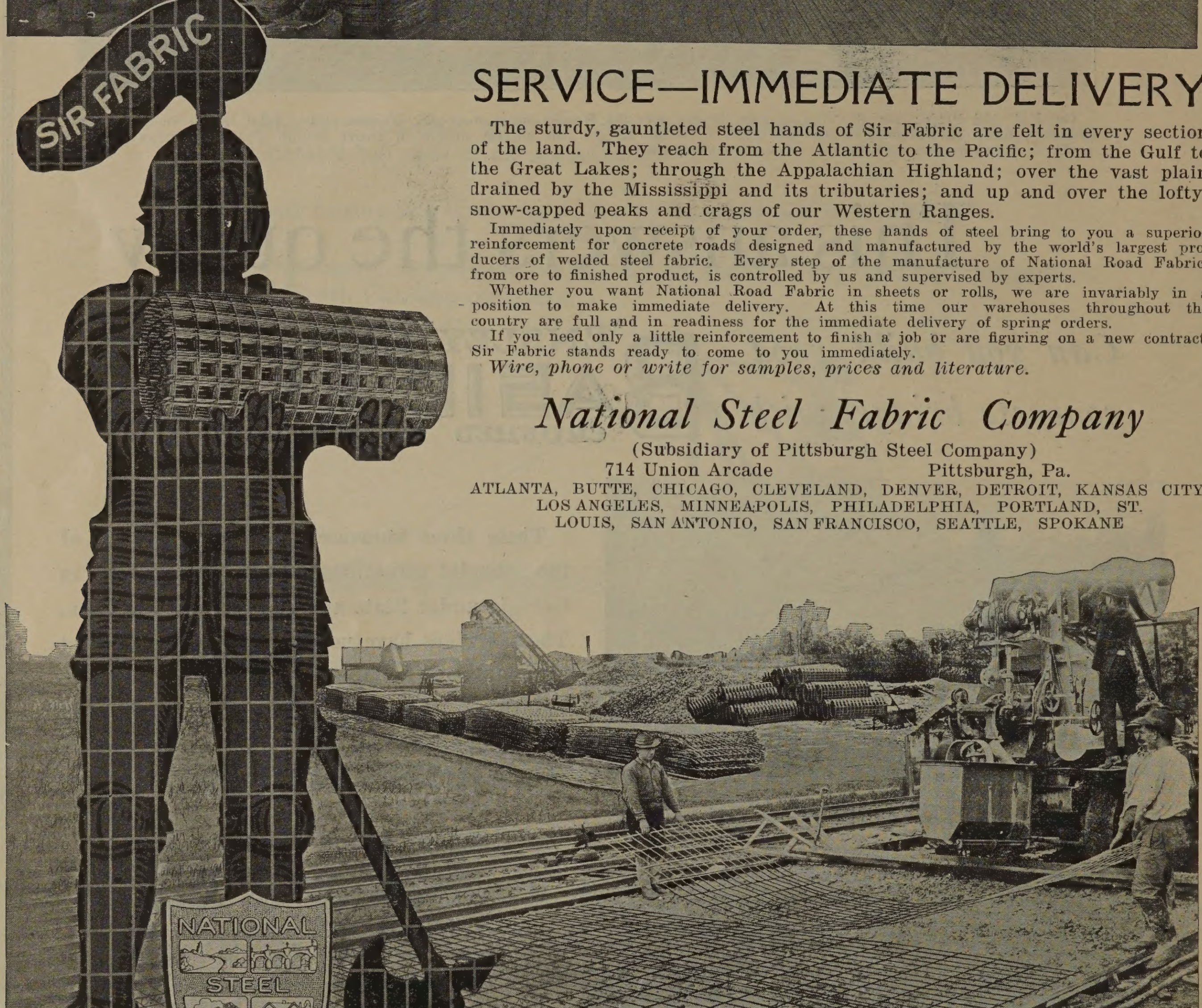


Ga. F. A. P. No. 136—A 738 ft. bridge of reinforced Slag Concrete spanning Withlacoochee river between Brooks and Lowndes counties, Ga. Built by Nichols Contracting Co., of Atlanta, Ga.

Birmingham Slag Co.

"Slag Headquarters for the South"

Atlanta BIRMINGHAM Thomasville



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The sturdy, gauntleted steel hands of Sir Fabric are felt in every section of the land. They reach from the Atlantic to the Pacific; from the Gulf to the Great Lakes; through the Appalachian Highland; over the vast plain drained by the Mississippi and its tributaries; and up and over the lofty, snow-capped peaks and crags of our Western Ranges.

Immediately upon receipt of your order, these hands of steel bring to you a superior reinforcement for concrete roads designed and manufactured by the world's largest producers of welded steel fabric. Every step of the manufacture of National Road Fabric, from ore to finished product, is controlled by us and supervised by experts.

Whether you want National Road Fabric in sheets or rolls, we are invariably in a position to make immediate delivery. At this time our warehouses throughout the country are full and in readiness for the immediate delivery of spring orders.

If you need only a little reinforcement to finish a job or are figuring on a new contract, Sir Fabric stands ready to come to you immediately.

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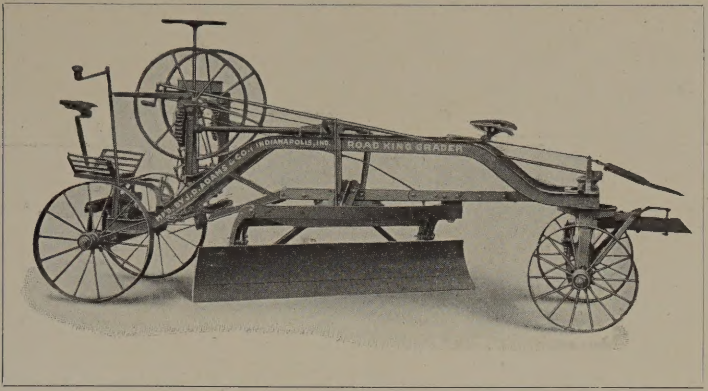
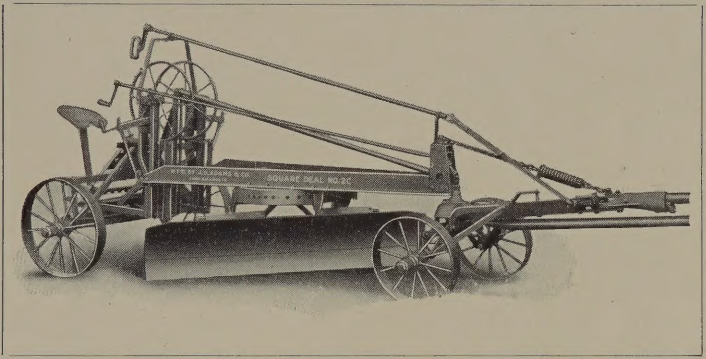
NATIONAL STEEL FABRIC CO
Subsidiary of PITTSBURGH STEEL CO
UNION ARCADE BUILDING PITTSBURGH, U.S.A.

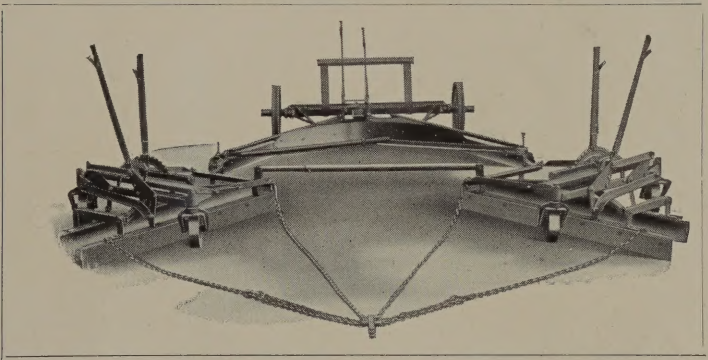
MOST MILES OF GOOD ROADS PER DOLLAR



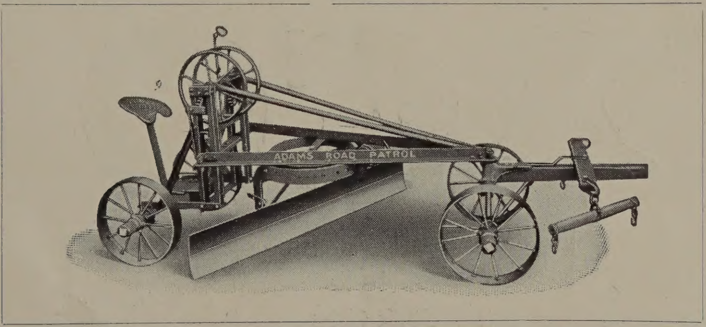
Road King Grader, 8-Foot Blade



Square Deal No. 2-C, 7-Foot Blade



Adams Road Maintainer



Adams Road Patrol Scraper

translated into working terms means Adams Road Building and Maintenance Equipment

For your road building grading use

ADAMS ADJUSTABLE LEANING WHEEL GRADERS

that are guaranteed to do more work for you with less power and therefore less cost, than any other graders on the market. The difference is in the leaning wheels—an exclusive feature on Adams Graders.

They are built with blades ranging from 7 ft. to 12 ft. long. There's a size to suit your work that can be furnished either for animal or tractor power.

To keep your roads always smooth and properly crowned, use

ADAMS ROAD MAINTAINER

a flexible machine which shapes both sides and crowns the center of the road in one operation, preserving the original contour of the road. Operated by one man and a truck or light tractor, it covers many miles of road a day, making the maintenance cost per mile very low. Adjustable to all road widths and conditions.

ADAMS ROAD PATROL

a mighty popular little one-man, two-horse maintenance machine for maintaining roads by the patrol system. Thousands in use all over the country.

We also manufacture a superior line of Road Drags, Scarifiers, Scrapers, Plows, etc.

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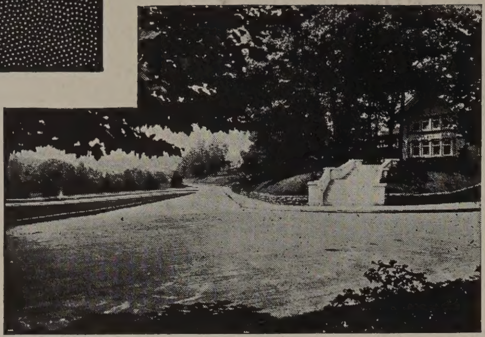
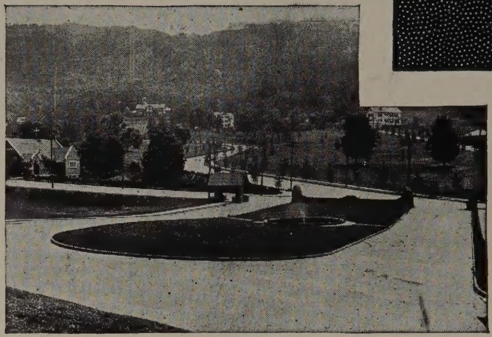


TEXACO Asphaltic Concrete in the famous Grove Park Section of Asheville, N. C. This pavement was built in 1917 on old macadam.

To combine beauty with durability. That was the paving problem in Asheville, N. C., America's famous resort. This problem was solved successfully by laying TEXACO Asphaltic Concrete.

Asheville now has thousands of square yards of durable, resilient TEXACO pavements, which harmonize in beauty with the entrancing scenic surroundings.



Another view of the TEXACO Asphaltic Concrete in Asheville, N. C., which was constructed in 1917.

Just as Asheville selected TEXACO pavements, so have many other world-famed resorts found TEXACO the most durable and serviceable.

Atlantic City and Long Branch in New Jersey, Mineral Wells in Texas, Florida's far-famed resorts, and many others have pavements that last—made of TEXACO Asphalt.

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